“A Love-Hate Relationship”:
Canadian Laypeople’s Construction of Academic Theories as Diffusing Innovations



By Kira Brayman
Lady Margaret Hall

Trinity Term

Dissertation submitted in part-fulfillment of the requirements for the degree of Masters of Science in Higher Education

Acknowledgements

Many thanks are due to those who have guided and supported me through the process of gestating and delivering this dissertation. Thank you to Prof. John Brennan for patiently humouring my big ideas and my stubbornness in narrowing them down, Prof. Rebecca Eynon, Prof. Harry Daniels, Prof. Hubert Ertl, and Dr. Helen Carasso for talking me through strange parts of my research that I found myself in, the research participants without whom this study would not have been possible, the library staff for their motivational speeches, and last but not least to all the friends and family who were somehow convinced into being my therapists, sounding boards, managers, and proof-readers.

Abstract

As the knowledge society paradigm and its emphasis on knowledge as socioeconomic capital grows, the importance of subtle, collective sharing of 'blue skies' academic theories is sidelined. Non-expert voices are largely marginalized in these discussions of what academic knowledge is or should be. In order to bridge gaps between academia and laypeople, and basic research and impact, this study explored how Canadian laypeople construed the popularity of academic theories across domains of physical sciences, social sciences, and the humanities, and related those perceptions to a novel measure of diffusion.

An integrated mixed-methods research design was framed by a constructionist philosophy and a conceptual framework rooted in Diffusion of Innovations literature, re-conceptualizing academic theories as constructed innovations. Ninety academic theories were input into Google Trends, which provided data regarding the frequency with which Canadians searched theory terms. This was used as a measure of initial diffusion. Repertory grids were produced with the completion of online interviews with fifteen Canadian laypeople, which captured the qualities of academic theories that they understood as being related to popularity.

Qualitative analyses revealed that Canadian laypeople had complex, mixed feelings about whether theories were beneficial or irrelevant. Cluster analyses identified themes of 'the nature of discussion', 'benefits', 'acceptance of the best knowledge', 'explanation of something meaningful', 'understandability', 'physically verification', 'scientific proof', 'religious belief', and 'applied use' as being used by laypeople to contrast the popularity of academic theories, the first three of which were most closely related to the initial diffusion of theories. Overall, the conceptual framework of innovations attributes from Diffusion of Innovations literature proved to be a fruitful application.

Table of Contents

ACKNOWLEDGEMENTS I

ABSTRACT II

LIST OF TABLES V

LIST OF FIGURES VI

INTRODUCTION 1
1.1 Rationale for Study 3
1.2 Outline of Chapters 4

LITERATURE REVIEW 5
2.1 Literature Search 5
2.2 Domains 5
2.3 Natures of Theories 6
2.4 Lay Perceptions of Physical Sciences 9
2.5 Lay Perceptions of Social Sciences 14
2.6 Lay Perceptions of Humanities 16
2.7 Summary 17
2.8 Filling in the Gaps 19

DIFFUSION OF INNOVATIONS AS A CONCEPTUAL FRAMEWORK 20
3.1 What is 'Diffusion of Innovations'? 20
3.2 Theory as Innovation 23
3.3 Innovation Attributes 23
3.4 Other Diffusion Concepts and their Relation to Innovation Attributes 26
3.5 Why Diffusion of Innovations? A Comparison with Other Knowledge Models 27
3.6 Summary 28

METHODOLOGY AND RESEARCH DESIGN 30
4.1 Research Questions 30
4.2 Philosophical Viewpoint: Constructionism and Symbolic Interactionism 31
4.3 Mixed Methods Design 32
4.4 Methods: Measuring Diffusion with Google Trends 34
4.5 Methods: Semi-Structured Interviews & Repertory Grids 39
4.6 Triangulation 45
4.7 Ethical Considerations 46
4.8 Summary 46

LAYPEOPLE'S PERCEPTIONS OF ACADEMIC THEORIES 47
5.1 How do Canadian laypeople construe the popularity of academic theories? 47
5.2 How do perceptions of academic theories vary between laypeople with different educational backgrounds? 53
5.3 How do perceptions of academic theories' popularity differ across domains? 56
5.4 Summary 60

THE DIFFUSION OF ACADEMIC THEORIES 61
6.1 Does initial diffusion of academic theories differ by domain? 61
6.2 What constructs of academic theory popularity correspond to diffusion? 64
6.3 Do Doi's innovation attributes match lay depictions of academic theories? 65

6.4 SUMMARY 71
CONCLUSION 73
7.1 LIMITATIONS OF RESEARCH 74
7.2 FURTHER RESEARCH 74
REFERENCES 76
APPENDIX 1: CUREC ETHICAL APPROVAL 87
APPENDIX 2: CATEGORIZATION OF THEORIES INTO DOMAINS 88
APPENDIX 3: INTERVIEW PROTOCOL 90
APPENDIX 4: REPERTORY GRIDS 98
APPENDIX 5: ELEMENT TREE DIAGRAMS 113
APPENDIX 6: CONSTRUCT TREE DIAGRAMS 128
APPENDIX 7: THEMATIC ANALYSIS OF CONSTRUCT CLUSTERS 143
APPENDIX 8: CODING FRAMEWORK 149

List of Tables

TABLE 2.1: SUMMARY OF ACADEMIC THEORIES AND LAY PERCEPTIONS BY DOMAIN 18
TABLE 3.2: AN OUTLINE OF MAJOR MODELS OF KNOWLEDGE TRANSMISSION 28
TABLE 4.3: TESTS OF NORMALITY 39
TABLE 5.4: REPEATED CONSTRUCTS 49
TABLE 5.5: CLUSTER THEMES 51
TABLE 5.6: FREQUENCY OF ELICITED CONSTRUCTS BY EDUCATION LEVEL 55
TABLE 5.7: CLUSTERS OF ELEMENTS 58
TABLE 6.8: BONFERRONI POST-HOC CONTRAST OF DIFFUSION ACROSS DOMAINS 63

List of Figures

Figure 3.1: Diffusion Curve 21
Figure 4.2: Fully-Integrated Mixed Research Design 33
Figure 4.3: Boxplot of Initial Diffusion by Domain 38
Figure 4.4: Repertory Grid Example 43
Figure 5.5: Paul's Construct Tree Diagram 50
Figure 6.6: Initial Diffusion of Academic Theories 62

Introduction

What is the role of the Ivory Tower in 'the real world'? What is the function of academic knowledge in wider society? These old questions have been responded to in many ways over the long history of higher education (HE) and continue to be debated through the transition between paradigms of knowledge as 'public good' (in terms of social justice (Williams, 2014)) and 'the knowledge society' (a period of unprecedented societal production and use of knowledge as capital (Slaughter & Rhoades, 2004; Szelényi & Bresonis, 2014)). Despite vast differences between these two paradigms of knowledge production, both continue to guide the social role of universities towards creating knowledge that benefits non-academic publics.

In addition to the ideological rationales of either paradigm, on a pragmatic level publics are stakeholders in academic knowledge production because they fund a large portion of university research (Calhoun, 2006) and are affected by the process and products of academic knowledge creation. Universities are powerful, social institutions that influence societal perceptions of truth (Calhoun, 2006). By credentialing elites and professionalizing experts, universities perpetuate an "academic hierarchy" (Calhoun, 2006, p. 31), in which knowledge is no longer the domain of all, but of a select few. Nowotny, Scott, and Gibbons (2001) echoed this sentiment when they linked the privileging of scientific knowledge to the power and distance of scientists from the rest of society. For Hilgartner (1990), scientists maintained an "epistemic hierarchy" (p. 533) by portraying popular accounts of sciences to be distorted versions of 'genuine' scientific knowledge, which therefore remained the exclusive domain of scientists. Hilgartner (1990) retorted to this construal of popularization by asking 'where is the boundary between genuine and popularized scientific knowledge?' He suggested that transformation of knowledge was inevitable, beginning from even initial academic conceptions. For academics to acknowledge the constructed nature of their knowledge

would be to call into question the status of academic knowledge as superior to other knowledges. Thus, in the process of creating knowledge publics have been marginalized because of their supposed lack of expertise, which ultimately continues to support an intellectual hierarchy.

The hierarchy of knowledges does not mean that academics have all the power to create knowledge while non-academics have none, but rather that academics "must compete with other social groups over the definition of legitimate knowledge" (Brunner et al., 2000, p. 71), including publics. Publics might not be able to use scientific knowledge the way scientists think they should (Wynne, 1995), but they can still shape the meaning of sciences. Scientists present scientific knowledge, but

> [t]he task of 'making sense', of attributing cultural or individual meanings to the latest accomplishments of science, and the challenge of integrating new knowledge and the products, practices and altered lifestyles which flow from this knowledge into an already existing social and cultural world, are left to others. (Nowotny et al., 2001, p. 62).

Publics reinterpret and reflect back a construction of sciences that goes on to contextualize and shape future sciences (Hilgartner, 1990; Knight, 2011; Locke, 1999; Nowotny et al., 2001; Setala & Valiverronen, 2011; Wynne, 1995). Public access to academic knowledge becomes therefore an ethical matter of redressing social power imbalances, a financial and democratic right, and vital for public reinterpretation and reinvention of academic knowledges.

The kind of academic knowledge of interest is 'blue skies', 'Mode 1', or 'basic' research – research that is interested in discovering fundamental knowledge. Theories in particular represent basic research well, as they constitute intellectual constructions of other knowledges. Basic research is closer to the traditional, 'pure' pursuit of academia, more exclusively the domain of scholars, and with potentially greater cultural implications than 'Mode 2' patents, products, or applications, which are slowly dominating academic knowledge production (Grek & Ozga, 2010).

Given that their purpose is not for immediate application to society (Szelényi & Bresonis, 2014), how theories and other Mode 1 knowledges impact wider society is

more vague and nebulous, yet potentially significant. In her comparison of academics' interpretations of impact, Oancea (2011) captured their notion of cumulative, collective, and subtle spreads of ideas with the term 'diffusion'. Despite reaching the largest stakeholder group of "the non-academic world" (p. 28), diffusion has been relatively insignificant to discussions of research impact, due to difficulty in attributing it to particular research(ers) (Oancea, 2011). Ultimately, concerns that impact agendas will "lead to a devaluation of 'blue skies' research" (Penfield, Baker, Scoble, & Wykes, 2014, p. 23) are increasing. Understanding diffusion is critical for researchers, disciplines, or domains that understand the social role of their academic work as occurring through more gradual cultural diffusion, such as the humanities (Belfiore, 2014; Benneworth, 2014; Oancea, 2011). The diffusion of basic research to society should be evaluated before it becomes relegated to the ruins of the Ivory Tower. Shifting focus to diffusion could rebalance knowledge production paradigms towards ideas of public good, and reveal epistemic hierarchies for negotiation.

1.1 Rationale for Study

Two main aims of this dissertation were to explore laypeople's perceptions of academic theories and to relate those perceptions to diffusion. Even where publics were acknowledged as stakeholders in academic knowledge production, they were often still portrayed as an object in a conversation held by academics. Adding lay voices to discussions of the merits and shortcomings of academic theories addresses a critical and moral issue, serving to demonstrate the legitimacy of their opinions on traditionally exclusively academic topics.

Relating lay constructions of academic theories to diffusion further illustrates the importance of lay perspectives to diffusing and reimagining academic ideas, and draws attention to the forms of academic knowledge over problematization of laypeople's education, attitudes, or trust.

Furthermore, Canada represents an ideal area to delimit the study, as its absence of a research impact agenda makes it a more neutral context for studying lay perceptions and diffusion of academic theories. In addition, contribution to diffusion of innovations (DoI) and public understanding of science (PUS) literature is greater by researching an area where those frameworks are comparatively unemployed.

1.2 Outline of Chapters

Lay perceptions and diffusion of academic theories are examined over several chapters. The second chapter outlines the academic literature relevant to lay perceptions of physical sciences, social sciences, and the humanities, as well as the natures of theories. The third chapter outlines the conceptual framework from DoI literature, followed by an explanation of the study's research design and methodology in the fourth chapter. The report and discussion of empirical findings are split over the fifth and sixth chapters: the fifth chapter covers results related to the first research question, 'how do Canadian laypeople construe the popularity of academic theories?', and the sixth chapter responds to the question 'how do lay perceptions of theory popularity relate to theory diffusion?'. The final chapter summarizes and concludes the dissertation.

Literature Review

There is no field of study that specifically discusses lay perceptions of academic theories, or how those perceptions relate to diffusion. The most relevant areas of literature are 'public understanding of science' and similar research in the social sciences and the humanities, and essays on the natures of theories. This chapter describes the method of searching literature, the meaning of domains, and the natures of theories, followed by an outline of research on lay perceptions of physical sciences, social sciences, and humanities. A summary of the literature review is then provided, and finally mention is made of how this study contributes to the literatures.

2.1 Literature Search

For topics related to the public understanding of physical sciences, social sciences, and the humanities, Web of Science, one of the largest academic databases covering multiple domains, was searched using combinations of lay/public, attitude/perception/ understanding/conception/opinion, and science/biology/chemistry/physics or social science/psychology/geography/economics/anthropology/political science/sociology or humanities/arts/philosophy/linguistics/history as title search terms. Web of Science was also used to search for literature on theories, using the combination of theor*, formation/construction/nature/creation/structure, and science*/social science*/ humanities/arts (where * allowed for any ending to the root word provided). Following citations and forward citation searching was completed for particularly relevant articles.

2.2 Domains

Physical sciences, social sciences, and the humanities, are well-recognized academic domains of knowledge that represent unique epistemic cultures (Becher & Trowler, 2001). As such, domains are key factors in the organizational structure of knowledge in higher education institutions (HEIs), recognizable as faculties containing discipline-based departments (Becher & Trowler, 2001). The boundaries between disciplines and

domains are not definite; territories are constantly negotiated and increasingly confused by interdisciplinary research (Becher & Trowler, 2001). The delimitation of domains in this dissertation reflected current, dominant structures of academic knowledge.

It should be noted that 'science' and 'scientific' often ambiguously refer to physical sciences, social sciences and physical sciences, or academia in general. In this work, 'sciences' is used to refer to physical sciences unless otherwise specified. Quotations from other authors should be interpreted within the context they are presented.

2.3 Natures of Theories

Theories are more particular types of knowledge than domains or disciplines, although change according to the aims, epistemology, and methodologies of their domains. Theories are abstract selections and constructions of data into a "unified conceptual scheme" (Zima, 2007, p. 3). In other words, theories are an intellectual organization of phenomena into a general principle, forming patterns and order out of a wide array of information (Furnham, 1988; Kelly, 1955; Selltiz et al., 1959; Valentine, 1992; Zima, 2007). By expressing a set of relationships between phenomena, theories describe reality (Knight, 2011; Nasshei, 1989; Zima, 2007), consequently becoming lenses through which reality is interpreted (Kelly, 1955; Zima, 2007).

This makes theories of particular importance to shaping culture, as "we are socialized in cultural situations marked by ideological and theoretical languages, which contribute decisively to the development of our perception, our thought and subjectivity" (Zima, 2007, p. 3). Theories are not just objective facts, but frameworks that influence how we perceive the world. Nor are they apolitical: Zima (2007) went so far as to call theories discourses, semantic creations by a subject with its own social interests and viewpoints. Theories are constructions contextualized by social norms, historical trends, and personal beliefs. Thus, theories guide society at the same time that society guides theory.

As referenced in the Introduction, the cultural transition to the knowledge society paradigm, complete with conceptualizations of knowledge as socioeconomic capital, is

potentially changing the way that theories interact with wider society. Stehr (1994) and Bell (1976) theorized that the knowledge society rested on the codification of theoretical knowledge into innovations, first at a technological level, and subsequently at a social level as a hierarchy of expertise formed a knowledge labour force. Theories may thus have a more prominent place within the knowledge society, through their being applied to objects.

2.3.1. Lay Theories versus Academic Theories

The aims, functions, and forms of theories differ largely according to the context in which they are used, and who they are used by, although

> the distinction between lay and scientific theories is by no means clear. Various distinctions were made which may be useful to clarifying what may constitute a scientific, as opposed to a lay, theory though it should be admitted that many theories accepted as scientific do not fulfill these criteria, while many lay theories do (Furnham, 1988, p. 20).

Having acknowledged the limits of typologizing, Furnham (1988) distinguished scientific (expert academic) from lay theories on several accounts: whether it 1) is explicit, formal, or detailed in definition, 2) is coherent or consistent with other theories, 3) is deductively falsifiable rather than biased towards confirmation, 4) differentiates causation from correlation, 5) explains process rather than describes content, 6) is situational rather than individualistic, 7) generalizes rather than specifies, and 8) is evidence-based. Arguably the differences in form of lay and academic theories can be ascribed to differences in their aims and functions, since the function of theories depends on their social context (Zima, 2007).

According to Hewstone (1983), lay theories serve multiple functions, such as achieving control through the understanding of cause and effect, protecting and enhancing feelings of personal worth, and gaining public approval. These latter personal and social functions depict the motivational tendency of people to believe that which defends their own position in society (Furnham, 1988; Hewstone, 1983). These functions can apply at a societal level, as theories can maintain social power through symbolic capital (Zima, 2007). Kelly (1955) emphasized the psychological use of theories as a way of

making a more consistent and predictable world. Theories also serve to create understanding at a formal academic level, though towards the aim of intellectual insight (Blalock, 1969), rather than that of daily functioning. The functions of academic theories include: reducing diverse observed phenomena to a general principle, making findings of research meaningful, and guiding inquiry by relating isolated findings (Selltiz et al., 1959). The aims and functions of theories for laypeople and academics are different, but are by no means mutually exclusive.

2.3.2. Theories across Domains

Differentiation of theories by domains show idealized constructions of theories, which may not exist the same way in reality.

Theory is perhaps of particular importance to the (physical) sciences, since "[s]cience begins when we begin to search systematically for explanations of phenomena" (Alexander, 1958, p. 30). Scientific theories have been strictly explicated as "lawlike propositions that interrelate the concepts or variables two or more at a time" (Blalock, 1969, p. 2), making the ideal theory a deductively closed system of concepts and propositions. In addition, the testability of scientific theory is of utmost importance (Blalock, 1969; Eysenck, 1981). Theories themselves are understood as only uncertain possibilities, which after a test of falsification become almost immutable facts: "only a revolution, sparked off by the accumulation of anomalous findings, and the emergence of an alternative theory, will dethrone such a theory" (Eysenck, 1981, p. 2).

The social sciences rest in many ways upon the same model of scientific theorization, but important differences in their subject matter lead several academics to differentiate social sciences theories. For example, Zima's (2007) portrayed social sciences theories to be descriptions of a subject-subject relationship, making objectivity and removal of value judgements a practical impossibility. Given the human nature of its subject, Valentine (1992) proposed that the aim of social sciences theories should be to "pursue empathetic understanding rather than causal predictive explanation" (p. 115). Thus, theories in the social sciences are differentiated from the physical sciences based on the

different natures of their subjects, resulting in either scientific theories of social phenomena (with inherent tension towards the phenomenon's normative and subjective aspect), or more humanistic, empathetic, and normative theories of social behaviour, which risk losing scientific structure.

Following the same vein, theories in the humanities are further separated from scientific theories. In Nasshei's (1989) review of Schwemmer's *Action and Structure: On a Theory of Science for the Humanities*, theories in the humanities privilege understanding over explanation. Where analytical theories are restricted by formal logic and rigid schemas, the strength of humanities lies

> in reducing the excessive complexity of reality and, by idealizing it, being able to understand it, and then in *producing* reality of their own, based on description and interpretation, that is sufficiently complex, so as to be capable of doing justice to the many-faceted reality (p. 164, italics in original).

This description denotes the humanities' self-awareness of the constructed nature of humanities theories, as theory is used to reimagine a complete world. This sentiment is echoed by Levi (1983), who noted that

> [w]hen historians stress scientific explanation, the central importance of the causal chain and its predictive value, they are, indeed, social scientists. But when they are governed by a sense of social value, using the narratives which they construct for what of human significance they anticipate or reveal, treating events as epochal or turning points in the story of the race or nation or of mankind, then their intentions show them to be humanistic in the most authentic sense of the word (p. 10).

The aims of the humanistic theory are not to explain or predict, but to reveal values and worth for humankind, and thus make meaning out of daily life (Kelly, 1955).

2.4 Lay Perceptions of Physical Sciences

2.4.1. Changes in Approaches to the Public Understanding of Science

From the 1960's, political and academic interest in the public perception of sciences has grown, developing into a field of study commonly referred to as the 'Public Understanding of Science'. Bauer (2009) outlined three major approaches of PUS: a scientific literacy model from the 1960's to 80's, a deficit model of positive attitudes around the 1980's and 90's, and a 'science-in-society' approach looking at the deficit of trust between publics and experts from the 1990's onwards. A fourth approach not

identified by Bauer is the role of 'society-in-science'. Each of these approaches is discussed briefly to contextualize this study in PUS literature.

Knowledge Deficit

Initially borne out of concern that the scientific illiteracy of the public would prevent their being informed citizens, pioneers in PUS studies constructed measures for the scientific knowledge of the public (Bauer, 2009). Many have since problematized this approach for being a reductionist 'deficit model' that debases the public to an ignorant mass and "build[s] in normative assumptions about the public, about what is meant by science and scientific knowledge, and about understanding" (Wynne, 1995, p. 370). Despite well-founded and pervasive charges laid against it, the 'knowledge deficit' perspective is still common.

Attitude Deficit

Most appearances of the knowledge deficit model are now embedded in an 'attitude deficit' model. For example, Walsh (1982) discussed the American public's growing concern over the risks of sciences and fewer perceived benefits, representing the sentiment that worsening public attitudes posed a threat to sciences. The attitude deficit is often intertwined with the knowledge deficit approach. Quantitative investigations of the relationship between knowledge and attitude to sciences abound, with most finding a positive relationship (see Allum, Sturgis, Tabourazi, & Brunton-Smith, 2008; Bak, 2001; Sturgis & Allum, 2004). This linear knowledge-attitude relationship was often qualified however, by subtle differences in kinds of topics or knowledge (see Allum et al., 2008; Bak, 2001; Bauer, 2009). Although it is complicated, studies agree that there is an important relationship between public knowledge and attitudes to sciences.

Science in Society

The third shift in PUS research, often termed 'science in society', refocused the field towards trust and social relationships between scientists and the public. For Wynne (1992), information was judged not only intellectually, but also according to the trust

that the public had for scientific information, which was in turn a dynamic product of the public's social network and position. Mikulak (2011) went so far as to use the idea of 'two cultures', claiming that sciences and 'non-sciences' were essentially dichotomous cultures. The solution to this deficit in social connectedness was a "two-way negotiation of meaning" (Mikulak, 2011, p. 206). For many, such as Sturgis and Allum (2004), and implicitly Einsiedel (1994) and Retzbach, Marschall, Rahnke, Otto, and Maier (2011), trust has become just another quantitative variable by which to explain the gap between sciences and society.

Society in Science

Stemming from studies in the sociology of scientific knowledge (SSK), a fourth stream, identified as 'society in science', reframes PUS to consider how social context shapes sciences and scientific institutions. Locke (1999, 2001) identified scientific epistemology as rhetoric – a choice made by scientists to construe the nature of their work in a particular way, embedded in a dynamic social context. For Locke (1999), the lay-expert distinction is established with the use of rhetoric: scientists and creationists equally defended their outlook by construing their belief as positivist, impersonal, passive, and therefore true, and challenged the opposing outlook using ideas of agency and human activity, making findings contingent on the knower. The question for PUS studies then becomes 'how do scientists and non-scientists present sciences, and how are these meanings negotiated?' (Mikulak, 2011).

Publics are not just passive recipients of scientific knowledge, but rather actively make their own intellectual world (Wynne, 1995). Even ignorance is a choice made to save time, prevent uncertainty, or uphold social roles (Wynne, 1995). Thus, ignorance is not simply a failure of education, personal attitudes, or communication, but reflects a deeper social divide between laypeople and scientists in how they relate to scientific knowledge. While this is an active choice, it is one nevertheless embedded within power dynamics between scientists and laypeople (Hilgartner, 1990; Locke, 1999; Lujan & Todt, 2007; Wynne, 1995).

2.4.2. Scientific Definitions of Science

As alluded to by Hilgartner (1990), Locke (1999), and Nowotny and colleagues (2001), the privilege of scientific institutions is due in part to the nature of its epistemic rhetoric. Knight (2011) described the historical shift from science as natural beauty or usefulness to science as uniformity, suspended judgement, careful reasoning, and educated organization, in what is widely referred to as the rational image of science. Rationalism allows that everything is knowable through calculation, purely, without personal or social bias, resulting in an image of science as universal, a-social, and uniform (Locke, 2001). Wynne (1992) elaborated on the image of a rational science as an attempt to control and predict the natural world, claiming certainty even though scientific methods clearly have limitations.

In her investigation of scientists' self-portrayals, Horst (2013) argued that in portraying sciences, scientists engage in sense-making,

> representing science and its organizations in a very broad sense and enacting particular understandings of what science, scientific organizations, and scientists are and should be. In this perspective, science communication can be viewed as… a process of enacting meaning in order to achieve a coherent worldview (p. 760).

In this way, scientists are not wholly unlike publics in how they construct ideas of science.

2.4.3. Evaluations of Sciences by Laypeople

Scientists and mass medias commonly portray non-experts who challenge the image of rational science as people deficient in knowledge, positive attitudes, or rationality (see Setala & Valiverronen, 2011; Wynne, 1995). Lay evaluations of sciences are much more complex than this over-simplification allows. In his study of Cumbrian sheep farmers, Wynne (1992) presented criteria guiding their evaluations of sciences: whether it worked, attentiveness to lay knowledges, recognizability of form and content, openness to criticism, institutional affiliations, and connection to other experiences. Despite the generally non-intellectual nature of these elements, farmers were still rational in how they noted inconsistencies between sciences and reality (Wynne, 1992). Laypeople are

not irrational. Based on their social position, laypeople do not receive, nor are they interested in, the same kind of knowledge as scientists, so "[i]nstead, as competent outsiders, they should draw on other criteria to determine whether to trust a proposed claim" (Bromme, Scharrer, Stadtler, Hömberg, & Torspecken, 2015, p. 37).

Looking beyond scientific means of evaluating sciences, Sinatra, Kienhues, and Hofer (2014) addressed epistemic cognition – individual epistemological beliefs and theories at the domain, discipline, or topic level, which guide understandings of sciences (and other knowledges). Sinatra and colleagues (2014) distinguished four dimensions of epistemic cognition: certainty (tentative, absolute, or stable), structure (interrelated or isolated), justification (claim evaluation), and source (knowledge origin). Roth and Lucas (1997) rejected static, true epistemologies however, in favour of understanding epistemological justifications as socially contextualized rhetoric – used and changed according to the circumstances.

Krull and Silvera (2013) investigated what factors influence public perceptions of what is 'scientific', and found that topics and equipment related to the natural sciences are judged as more scientific and more important than those related more to the social sciences. Using repertory grid technique, Bezzi (1999) had students develop a set of constructs to categorize and depict scientific disciplines. From this, Bezzi (1999) identified five factors for characterizing sciences: 1) objects, areas, or techniques of investigation, 2) the nature of the science, 3) application or professional aspects, 4) affective aspects, and 5) course characteristics. Thus, while there is not one science, 'sciences' is taken to mean physical sciences, and are characterized by non-experts according to their topic content, epistemology, methodology, and application. Even within physical sciences, some presentations are perceived as more 'scientific' (and therefore credible) based on their form of citations, but not their statement of methods (Bromme et al., 2015). Superficial aspects may have a greater affect than methodological characteristics on perceptions of science.

In Ontario, Canada, Park and Woodruff (2014) tracked the scientific epistemologies of several students going through secondary school sciences, finding some common

characterizations of science: deals with the physical world, experimental and empirical, experiments can prove or disprove an idea, can be influenced by society, universal outcomes, and theories are not (yet) true as they lack evidence. Although not generalizable, these findings demonstrate individual differences in perceptions of sciences, along with educational influence of these perceptions. Not much other research has been done on PUS within Canada Einsiedel (1994). Through deeper investigation, the Canadian context is likely to show many of the same complexities for PUS as described above.

2.5 Lay Perceptions of Social Sciences

2.5.1. Is it Social or Science?

To begin discussion of public attitudes towards social sciences, public attitudes towards psychology are illustrated. Lilienfeld (2011) unpacked public scepticism towards psychology, finding significant public doubt regarding the importance of formal science to psychology, as it was understood as not using scientific methods, not generalizable, not reliable, unable to predict precisely, and less useful. This is echoed by findings that academics and the American public alike rated 'hard' sciences (physical and traditional subjects) as more contributory to society (Janda, England, Lovejoy, & Drury, 1998).

Teo (2012) challenged Lilienfeld's implicit assumption that psychology should be recognized as a science, problematizing the 'scientific nature' of psychology on the basis of its focus on human subjects and interpretations over general laws. Social sciences are of interest precisely because of their "personal, subjective meaning" in addition to its "natural-scientific foundation" (Teo, 2012, p. 807).

The social aspect is prominent in lay understandings of social sciences. In a review of lay conceptions of unemployment, wealth, and inflation, Furnham (1988) found that "lay explanations for economic phenomena are often normative, moralistic, socio-political as well as economic" (p. 134). Laypeople emphasize internal, human factors rather than external, structural ones (Furnham, 1988). The comparative absence of formal reasoning

using economic principles reflects how, by virtue of being interested in social subjects, social sciences are perceived as more intuitive.

2.5.2. It's Just Common Sense

The worrisome dismissal of social sciences as less useful likely results from the perception that social sciences are just matters of common sense. Lilienfeld (2011) attributed this to hindsight bias, whereby research findings (of psychology) appear obvious only after they are disclosed. Furnham (1988) substantiated this position in his statement

> [t]o many laymen, the theories they come across in a number of the social sciences – psychology, management, sociology, criminology – are common sense. That is, the theories or findings are already well known, and hence the research is thought to be a trivial, expensive and pointless exercise describing or proving what we already know. (p. 24)

Furnham (1988) offered a deeper explanation for how and why this conflation occurs: by its very nature, the social sciences investigate issues that are more intimately tied to personal experience, and therefore exist alongside lay theories about the same issues. Many laypeople are able to correctly predict behaviours based on their own experiences, to the point where formal courses in psychology "don't make much difference in people's lay knowledge of psychological theories and principles" (Furnham, 1988, p. 56). Thus, social sciences are more likely to conflict with prior beliefs, and so risk being dismissed, reduced to simpler explanations, or rejected as inappropriate applications of a scientific approach to social issues (Lilienfeld, 2011).

The notion of social sciences' obvious findings is picked up by Sjöström, Sowka, Gollwitzer, Klimmt, and Rothmund (2013), who affirmed that social sciences experts constituted just one point of view among another 'expert' voices, such as politicians or corporations, producing apparent conflict and confusion. Consequently, social sciences are understood as less certain and as requiring more subjective interpretation using one's common sense (Sjöström et al., 2013). Thus, while Sjöström and colleagues (2013) concluded that the general public holds "a benevolent and informed evaluation of the

contribution of social sciences [to providing answers to some social problems]" (p. 35), they also found that social scientists did not hold greater influence than other agents.

2.6 Lay Perceptions of Humanities

Academic discussions on public perceptions of humanities are even more lacking than for social sciences.

2.6.1. Attitudes Towards the Humanities

Only a couple of studies found investigated public attitudes towards the arts or humanities. Within Canada, two studies researched public attitudes towards the arts (Pettit, 2000), of which the Canadian Arts Consumer Profile (CACP) found that "Canadians show a rather mixed set of attitudes regarding the uses and values they are prepared to attribute to the arts" (Decima Research & Les Consultants Cultur'Inc, 1992, p. 52), with generally positive, albeit weakly held, attitudes towards the arts.

Focusing more on the humanities, Mesaros (2011) discussed the varied reactions of Liverpool residents to a philosophy street festival, categorizing attitudes to public philosophy as: philosophy cannot be public as it is inherently elitist; public philosophy is dangerous to the stability of society; public philosophy can be spontaneous, but not academic; public philosophy is only legitimating something extrinsic; philosophy should be spread to enhance wellbeing; or philosophy is inherently public. Although the belief that philosophy should be furthered as a means to improve wellbeing was the most widely held, the range of perceptions demonstrates the complexity of public perceptions of philosophy, as well as tensions regarding public philosophy and notions of academic elitism, academic quality standards, social stability, and economic productivity (Mesaros, 2011). Mesaros (2011) also identified public frustration with philosophy's tendency to endlessly problematize issues instead of providing solutions to problems, indicating a tension between the social needs of the public with the esoteric nature of academic philosophy.

Although the studies above by no means encapsulate a complete or consistent picture of any public's perception of the humanities, they represent the literature available. The picture painted thus far by these studies is of a large portion of the public who support but do not prioritize the humanities, along with a smaller, more active portion who engage in debates on the nature and role of humanities beyond academia.

2.6.2. The Humanities in Comparison with Physical and Social Sciences

Despite tension between academic and non-academic forms of philosophy, the humanities as a domain epistemologically allows for greater contextualization and interpretation in creating knowledge. Mesaros (2011) described the public as inherent philosophers by virtue of how they participate in creating the meaning of philosophy as soon as they read and interpret philosophical texts, and Berridge (2003) pointed to the role of publics in interpreting historical facts, in competition with historians. Although other researchers acknowledged that laypeople co-create scientific knowledge as well (see Hilgartner, 1990; Knight, 2011; Locke, 1999; Nowotny et al., 2001; Setala & Valiverronen, 2011; Wynne, 1995), the humanities may have greater flexibility to engage with publics than physical or even social sciences, without disrupting its epistemology of reflexively and subjectively recreating a world.

Scholars have also differentiated the humanities from other domains in reaction to research impact discourses. In what Belfiore (2013) refers to as the 'rhetoric of gloom', the humanities have struggled to accept, translate, and integrate an impact impetus, largely due to how the effects of humanities research are not necessarily immediate nor easily measurable, but rather occur through a slow circulation of ideas (Benneworth, 2014). The knowledge products of the humanities consist almost entirely of 'Mode 1' ideas without direct technological or social manifestations.

2.7 Summary

Studies in public perceptions of academic domains and disciplines have generally followed a trajectory from models of knowledge deficit, to deficit in positive attitudes,

to deficit of communication and trust in academia, and finally to social relationships between society and academia, including how non-academics shape knowledge. These streams are not mutually exclusive; each represents an important contribution to a holistic picture of public understandings of sciences, social sciences, and the humanities.

The boundaries between lay theories and expert theories, and the different ways in which these groups construct, use, and interpret theories are not always firm. Laypeople have an array of considerations when they evaluate knowledge, including intellectual assessments, social and personal motivations, beliefs, and experiences. This does not make laypeople irrational – it simply means that their social position entails different, appropriate uses of and relationships with academic knowledge. Indeed, social position is related to scientific literacy, attitudes, and trust. The power dynamics between academic institutions and laypeople are essential to recognize.

Theories are intellectual (and sociocultural) lenses through which phenomena are organized and understood, and are therefore particularly important in the knowledge-society relationship. The form, function, and purpose of theories differ between laypeople and experts, and across domains. A summary of the differences in theories and lay perceptions across domains is provided in Table 2.1.

Table 2.1: Summary of Academic Theories and Lay Perceptions by Domain

	Academic Nature of Theories	Lay Perceptions of Domain
Physical Sciences	• Deduction of variables • Test for falsification • Uncertain possibility • Predictive	• Non-intellectual evaluations • Physical topics and methods • Experimental, empirical • Universal outcomes
Social Sciences	• Tension between scientific and humanistic approach • Human subject	• Less scientific • More intuitive, common sense • Less useful, less certain
Humanities	• Understanding over prediction • Reconstruction of reality • Provide values and meaning	• Support without prioritization • Tension between academic and public versions

2.8 Filling in the Gaps

This study contributes to filling in gaps in the literature in several important ways: 1) it investigates the perceptions of academic theories as a particular type of academic knowledge, 2) it describes and analyzes *Canadian* laypeople's perceptions of academic domains and theories, 3) it compares across academic domains in order to understand their relative similarities and differences, 4) it describes and analyzes lay perceptions of humanities as a whole domain, and 5) it connects these perceptions to the concept of diffusion, discussed in the next chapter.

Diffusion of Innovations as a Conceptual Framework

As a term in higher education research 'diffusion' signifies the movement of knowledge from universities to a broader public, but to the best of my knowledge, is divorced from Diffusion of Innovations research (for example, see Hussler & Rondé, 2007; Kerner & Hall, 2009; Leisyte & Horta, 2011; Rosell & Agrawal, 2006; Wigren-Kristoferson, Gabrielsson, & Kitagawa, 2011), which systematically investigates the rate of adoption of innovations and the factors that contribute to this spread.

Concepts from DoI guided the research questions and design with the intention of examining, rather than assuming, the alignment between laypeople's perceptions of academic theory popularity and DoI innovation attributes. Imposition of a theoretical framework in a constructionist study seeking to privilege the voices of laypeople would be inappropriate, especially since the empirical fit between DoI and academic theories has not yet been established.

In order to describe and validate DoI as a conceptual framework for academics theories, this chapter first summarizes the main DoI principles. Second, theoretical justification is given for considering academic theories to be innovations. Third, innovation attributes from DoI studies are described. Fourth, other concepts related to DoI are reviewed. Fifth, the use of DoI over other knowledge models is rationalized. Finally, a summary of the chapter is provided.

3.1 What is 'Diffusion of Innovations'?

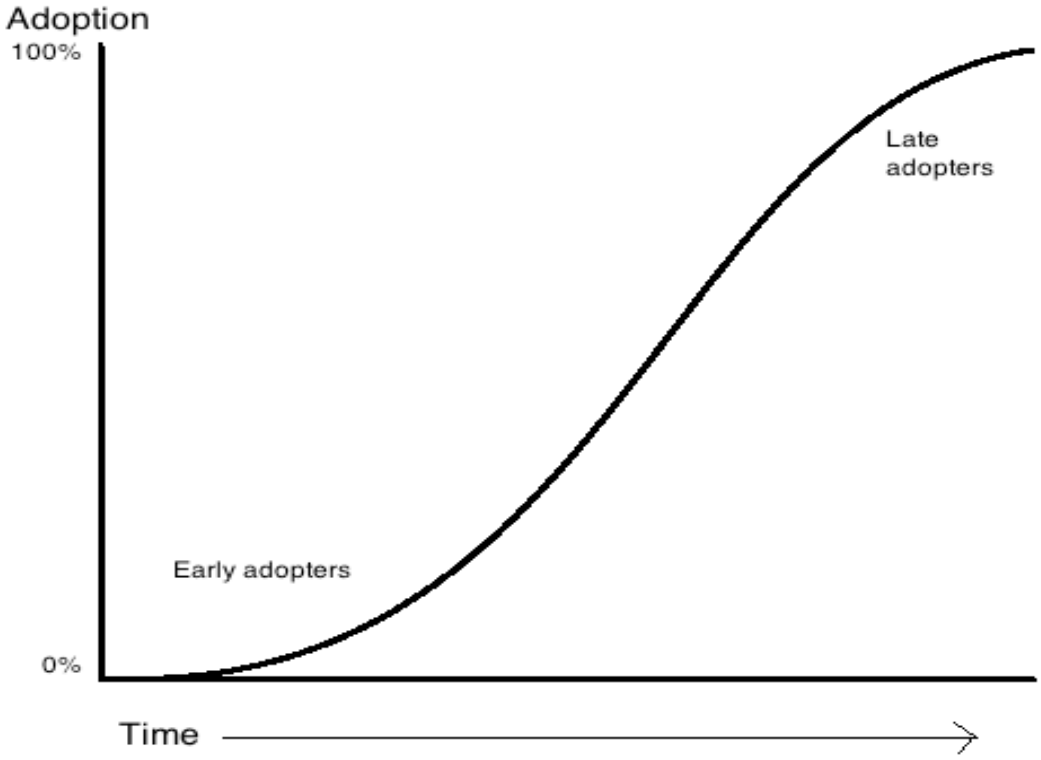
DoI has become a multi-disciplinary field, researching innovations such as agricultural practices, technologies, policies, birth control mechanisms, educational practices, and construction management strategies (Larsen, 2011; Wejnert, 2002). Now a sizeable area of study, DoI studies acquired conceptual and theoretical structure with Rogers' 1962 *Diffusion of Innovations*. Rogers' work has become the theoretical base for most subsequent studies of diffusion (Dearing, 2008; Kapoor, Dwivedi, & Williams, 2014;

Wejnert, 2002). By defining diffusion as "the process in which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 2003, p. 5), Rogers standardized a set of elements – the innovation, communication channels, time, and social system – that were key to understanding how new innovations spread.

3.1.1. Stages of Diffusion

Diffusion is an ambiguous term – there are many points between 'not diffused' and 'totally diffused', both in terms of amount and degree. Studies have demonstrated that the rate of diffusion resembles an s-shaped curve (Dearing, 2008), as in Figure 3.1 below. Early adopters are the first to accept an innovation and later adopters follow.

Figure 3.1: Diffusion Curve



Diffusion is most often equated with adoption (Weenig & Midden, 1991), but Rogers (2003) outlined five stages, whereby the potential adopter: 1) acquires *knowledge* about

the innovation, 2) develops an attitude towards the innovation as a result of *persuasion*, 3) makes a *decision* to adopt or reject the innovation, 4) *implements* the innovation into use, and 5) seeks *confirmation* for her decision. The main focus of this dissertation is the persuasion stage, and to a lesser extent the knowledge stage, explained in greater detail below.

For Rogers (2003), the 'knowledge stage' of diffusion involves exposure to an innovation and obtaining some understanding about how it functions. The knowledge stage centres around gathering information about an innovation in order to reduce uncertainty about it, although information seeking also occurs in the persuasion stage (Rogers, 2003). Knowledge of an innovation may be transmitted through a communication channel without the individual looking for it (Larsen, 2011), however chance communications are problematic given Rogers' (2003) notion of 'selective exposure', "the tendency to attend to communication messages that are consistent with the individual's existing attitudes and beliefs" (p. 171). Hassinger (1959) put forward a similar idea that awareness of an innovation only occurs because the individual first had a need for the innovation. Both notions suggest that awareness is not necessarily automatic or open, but rather mediated by the interests of the individual. However, Larsen (2011) contested both Hassinger and Rogers on the basis that

> actors' perceptions of what they need and their personal inclinations are influenced by their contextual setting, their communication network and the broader institutional forces. Therefore, it might be more difficult for actors to avoid innovations than Hassinger and Rogers initially suggest (p. 990).

The order of influence, needs, and awareness therefore remains unclear, although of definite significance for understanding how individuals become aware of different kinds of innovations.

After one obtains some knowledge about the innovation, adopters shift from a cognitive to affective action, for

> it is at the persuasion stage that general perception of the innovation is developed. Such perceived attributes of an innovation as its relative advantage, compatibility, and complexity are especially important at this stage (Rogers, 2003, p. 175).

To develop these perceptions, potential adopters actively seek information, now with the purpose of assessing credibility and interpreting the information. Social and media reinforcement is particularly sought during this stage as a means of confirming that one's beliefs are in line with the opinion of others (Rogers, 2003). This could take the form of innocent information gathering, or indicate peer pressure, groupthink, or power (Larsen, 2011). All evaluations of innovations are social in nature.

Rogers (2003) regarded this phase as distinct from the knowledge stage, despite his acknowledgement of predispositions in selective exposure and perceptions as inherently bound up with evaluation. Other authors' allusions in the previous chapter to existing lay attitudes towards even poorly known topics, similarly throw doubt on the complete separation of knowledge, perceptions, and attitude.

3.2 Theory as Innovation

Recently, innovation has become almost synonymous with technology. Within the DoI context, innovations can be technologies, but more generally "[a]n *innovation* is an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Rogers, 2003, p. 12). According to this definition, academic theories qualify as innovations as long as they are perceived to be new; recalling section 2.3, theories were shown to be new ways of understanding the world. But in what ways are academic theories like or unlike other innovations? Describing the particularities of theories as innovations is an important part of this research.

3.3 Innovation Attributes

Considerable attention has been focused within DoI literature on describing the attributes of innovations and relating those attributes to a rate of diffusion. After all, not all innovations are the same – some may diffuse widely quickly, while other 'failed' innovations may never reach even moderate levels of diffusion. In considering characteristics of innovations, what is important is the subjective or perceived nature of

the innovation, since it is the perception of the innovation that influences behaviour towards it (Rogers, 2003; Tornatzky & Klein, 1982).

Most diffusion studies, this one included, use Rogers' list of innovation attributes, "[o]wing to the fact that Rogers' theory holds the highest position and is well established in the world of innovations" (Kapoor et al., 2014, p. 328). The five attributes identified by Rogers are laid out below, with additional attributes mentioned afterwards.

3.3.1. Relative Advantage

Relative advantage denotes "the degree to which an innovation is perceived as better than the idea it supersedes" (Rogers, 2003, p. 15), encompassing factors such as economic profitability, social prestige, or convenience. This has led some like Tornatzky and Klein (1982) to critique relative advantage as essentially meaningless, "too broad and amorphous a characteristic to be of much use" (p. 34), arguing that it would be more useful to simply refer to its subsidiary factors. Doing so however, would make it difficult to aggregate and compare criteria for relative advantage across innovations (Moore & Benbasat, 1991). Relative advantage may require additional definition for particular innovations or particular adopters, but as it stands allows for generalizability.

3.3.2. Compatibility

The compatibility of an innovation refers to its consistency with "the existing values, past experiences, and needs of potential adopters" (Rogers, 2003, p. 15). Innovations perceived as diverting more radically from current norms and beliefs generally have a slower rate of adoption, as they are more risky and less meaningful to the adopter (Rogers, 2003). Tornatzky and Klein (1982) differentiated practical compatibility – congruence with practices and needs – from compatibility with values. All aspects of compatibility represent the mental shift required by the adopter in order to accept the innovation in her present circumstances.

3.3.3. Complexity

The degree to which an innovation is perceived as "difficult to understand and use" (Rogers, 2003, p. 16) indicates its complexity, which can act as a barrier to adoption. Perceptions of complexity are likely to vary according to the experience or expertise of the adopter (Rogers, 2003). Again, complexity can be specified according to the reasons particular innovations are considered complex (Tornatzky & Klein, 1982).

3.3.4. Trialability

Triable innovations are those which "may be experimented with on a limited basis" (Rogers, 2003, p. 258), allowing the adopter to try out how the innovation works. Tornatzky and Klein (1982) distinguished trialability and divisibility – whether one can try an innovation on a small scale (in comparison to trialability as limited but full-scale).

3.3.5. Observability

The last of Rogers' five innovation attributes, observability, reflects "the degree to which the results of an innovation are visible to others" (Rogers, 2003, p. 258). Implicated in this definition is the ease of observing the innovation itself, the ease of communicating the adoption of an innovation (Rogers, 2003), and the ease of observing the effects of the innovation (Tornatzky & Klein, 1982).

3.3.6. Other Attributes

In a recent systematic review, Kapoor and colleagues (2014) compiled a list of major innovation attributes other than Rogers'. 'Voluntariness' refers to whether the choice to use an innovation is perceived as being of free will, mandated, or forced by an external agent (Moore and Benbasat, 1991). 'Image' denotes "the degree to which use of an innovation is perceived to enhance one's image or status in one's social system" (Moore & Benbasat, 1991, p. 195), originally an aspect of Roger's 'relative advantage'.

Tornatzky and Klein's (1982) earlier systematic review of diffusion literature found that the five most referenced attributes (beyond Rogers') were cost, communicability,

divisibility, profitability, and social approval. Cost refers to the expense related to the innovation. Communicability, alluded to in Rogers' description of observability, is how well an innovation can be conveyed (Tornatzky & Klein, 1982). Divisibility, mentioned alongside trialability, is the ability to try an innovation on a small scale. Profitability denotes the perceived profit to be had from the innovation, usually in economic terms (Tornatzky & Klein, 1982). Lastly, the social approval of an innovation refers to the "status gained in one's reference group" (Tornatzky & Klein, 1982, p. 37), similar to but narrower in scope than 'image'.

Whether and how these attributes are used to categorize academic theories as innovations by laypeople remains a key issue for this study to address.

3.4 Other Diffusion Concepts and their Relation to Innovation Attributes

3.4.1. Communication Channels

The exchange of information regarding a new idea is essential to diffusion, as diffusion itself denotes a kind of communication (Rogers, 2003). The channels through which messages are sent are usually typified as mass media or interpersonal channels, although there exist a plethora in between (Lin & Burt, 1975; Rogers, 2003). Different types of communications are used in different ways through the stages of diffusion; the channels that provide awareness may not be the same channels that influence adoption (Lin & Burt, 1975). Recognizing which communication channels are used to gain information about academic theories is important for describing perceptions of academic theories.

3.4.2. Adopters

Individuals become aware of and adopt innovations at different times. Rogers (2003) categorized people according to what he labelled as their 'innovativeness', or their relative time to adopt an innovation. In a synthesis of diffusion research, Rogers (2003) put forward several generalizations about more innovative adopters, including their

greater formal education, socioeconomic status, social connections (including ones outside of their social system), exposure to mass media and interpersonal communication, active information seeking, and favourable attitude to sciences. Thus, there are many factors for how individuals perceive or use an innovation, many of which are influenced by social and cultural contexts.

3.4.3. Social Systems

Social systems delimit the boundaries of diffusion and their structures affect diffusion in several ways: social positions and communication networks influence how and what information is obtained by potential adopters; social norms can block innovative changes that go against tolerated behaviours; opinion leaders influence attitudes to innovations; innovation decisions can be made at a collective or authouritative level; and the consequences of an innovation can occur at a system level (Rogers, 2003). Wejnert (2002) offered a complementary set of environmental influences on diffusion, including the effect of spatial distance, cultural beliefs, traditions, homogeneity, political and legal regulations, and global institutionalization. The nature of the social system shapes how and which innovations are diffused, as well as how individuals respond to the innovations.

3.5 Why Diffusion of Innovations? A Comparison with Other Knowledge Models

Theorization of how knowledge moves between members in society has occurred simultaneously in several fields, which rarely consult each other for comparative frameworks (Graham et al., 2006). The resulting picture of knowledge transmission is a series of disjointed, overlapping models, some of which are depicted in Table 3.2 on the next page.

All models describe a meaningful way in which knowledge is or should be communicated, but DoI also includes concepts with which to compare innovations, whereas the other models inherently assume that all knowledge or research is good and equal. While DoI can still exhibit a pro-innovation bias (Rogers, 1983), it still identifies

criteria for how adopters choose to accept or reject innovations. Given the focus of this dissertation on lay perceptions of academic theories, DoI has the richest concepts to work with. Nonetheless, the DoI framework has certain shortcomings, namely reinvention of innovations by adopters is acknowledged but not incorporated (Rogers, 2003), failed innovations are often overlooked (Weenig & Midden, 1991), and innovations are examined in isolation rather than as competitive.

Table 3.2: An Outline of Major Models of Knowledge Transmission

	Diffusion	Dissemination	Knowledge Sharing	Knowledge Exchange
Definition	Communicating an innovation to a social system over time	Active, targeted messaging in order to produce awareness of information in its audience (Lomas, 1993)	Organizational circulation of knowledge, often focused on network structure and relationships	Collaborative engagement to build and apply knowledge (Graham et al., 2006)
Knowledge Object	Innovation: a new idea	Research findings/products	Information (institutional)	Academic research
Knowledge Creator	Unspecified	Researcher	Any group or individual	Academic researchers
Knowledge Receiver	Potential adopters in social system	Stakeholders or potential users	Potential user	Stakeholders
Network Structure	Social systems are complex factors contextualizing diffusion	Creator and receiver are separate, bridged by communication	Market, authourity, communal, or equality (Boer, Berends, & van Baalen, 2011)	Avoid hierarchy through user participation/ knowledge brokers

3.6 Summary

Diffusion of Innovations is the study of innovation adoption and the factors that affect the rate of adoption. Factors well explicated by DoI literature include communication channels, social systems, adopter characteristics, stages of diffusion, and innovation characteristics. Classifying theories as innovations is a unique construction of academic

theories that has not yet been applied. This study investigates whether innovation attributes (particularly relative advantage, compatibility, complexity, and observability) are fruitful ways to characterize academic theories and their initial diffusion, (what Rogers would classify as the knowledge and persuasion stages, both of which involve seeking out information and thereby forming perceptions of the innovation).

Methodology and Research Design

The wide array of concepts and elements surrounding lay perceptions and diffusion of academic theories required a complex methodology and research design. As a result, certain methods of data collection and analysis (using the Library of Congress subjects as a population of academic theories, using Google Trends as a measure of initial diffusion, and including an externally rated measure in repertory grids) were, to the best of my knowledge, novel approaches, but best suited to answering the research questions at hand. The originality of these methods does not imply their invalidity, only that they were innovative tools for conducting research.

To outline the research design clearly, elements that guided the design of the study are presented first: research questions, philosophical perspectives, and then mixed methods methodology. After, data collection and analysis methods related to secondary data from Google Trends and semi-structured interviews (including repertory grids) are explained. Finally, the triangulation of findings is established and the whole methodology summarized.

4.1 Research Questions

To address the aims of this dissertation (outlined in the Introduction), two main research questions were posed, each with follow-up subsidiary questions:

1. How do Canadian laypeople construe the popularity of academic theories?
    a. How do perceptions of academic theories vary between laypeople with different educational backgrounds?
    b. How do laypeople's perceptions of academic theories differ for the academic domains of physical sciences, social sciences, and the humanities?
2. How do lay perceptions of academic theory popularity relate to diffusion?
    a. Does the initial diffusion of academic theories differ between the domains of physical sciences, social sciences, and the humanities?
    b. What constructs of academic theory popularity correspond to initial diffusion?

c. Do innovation attributes from DoI literature match laypeople's depictions of academic theory popularity?

4.2 Philosophical Viewpoint: Constructionism and Symbolic Interactionism

A central concept in this dissertation is the social nature of knowledge creation and use. Constructionism is an epistemology well-fit to the topic and aims of this study, as it points out how knowledge is not apolitical and sterile, but imbued with ideologies and values (Schwandt, 2000). Constructionism hinges on the idea that people interpret and make meaning from events, objects and other phenomena, and these subjective meanings build a social reality (Andrews, 2012; Harris, 2010; Schwandt, 2000). For Schwandt (2000), in the constructionist view of the world people

> invent concepts, models, and schemes to make sense of experience, and we continually test and modify these constructions in the light of new experience…. We do not construct our interpretations in isolation but against a backdrop of shared understandings, practices, language, and so forth (p. 10).

The narratives or meanings which people supply the phenomena determine its qualities and even existence.

Harris (2010) differentiated what he called objective social constructionism from interpretive social constructionism. The former understands that a version of reality is built by people's constructions and social mechanisms, whereas the latter challenges that objects can ever have an inherent meaning, apart from what people bring to it. This dissertation draws more on the strand of objective social constructionism, admitting that social phenomena have a reality outside of the processes of human construction (Harris, 2010) so as to allow the comparison of constructions with a describable and measurable reality.

The theoretical perspective of interpretivism, or more specifically, symbolic interactionism is employed for its similar premise of knowledge as created – people make and interpret meanings in a social, interactive process and act based on those interpretations (Gray, 2014). In order to recognize how meaning is made and changes,

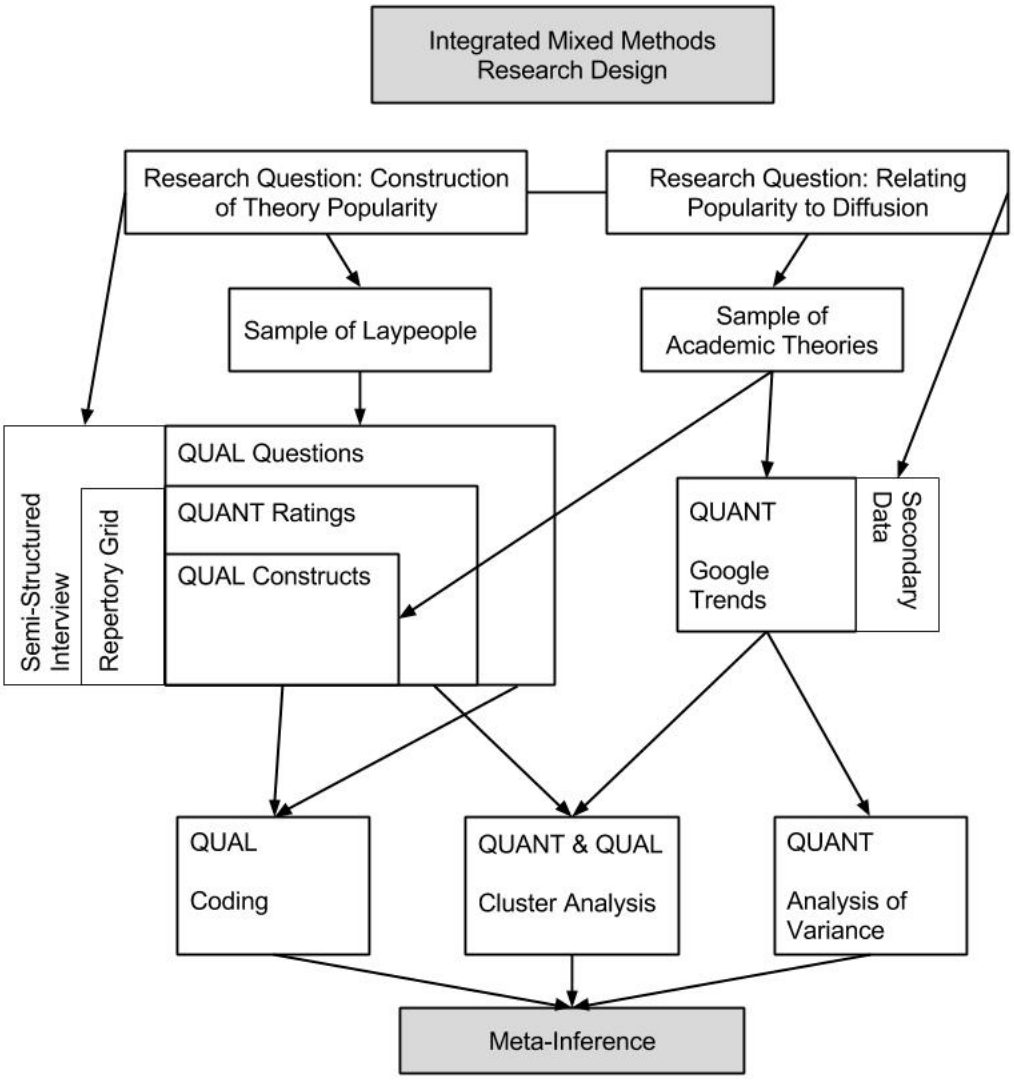
research aligned with symbolic interaction theory should attempt to understand the perspective of the subject (Gray, 2014), which can include multiple method research, so long as the focus remains on the process and context of meaning-making (Benzies & Allen, 2001).

4.3 Mixed Methods Design

A mixed methods methodology is ideal for research needing to explore unknown processes lacking in explanations and measures, and seeking to confirm central patterns of association (Creswell, Klassen, Clark, & Smith, 2011; Teddlie & Tashakkori, 2009). The need for a mixed methodology was determined primarily by research questions that required "employing rigorous quantitative research assessing magnitude and frequency of constructs and rigorous qualitative research exploring the meaning and understanding of constructs" (Creswell et al., 2011, p. 4). The research questions posed by this dissertation clearly demonstrated a need for qualitative data in order to describe perceptions and constructs, as well as quantitative data to assess the relationship of perceptions with diffusion.

Neither the questions nor the design however, are wholly separable into quantitative and qualitative components, shown in Figure 4.2 on the next page. Each of the methods contributes in multiple ways to analyses and interpretations of the research questions. Given the integration of qualitative and quantitative concepts, methods, analysis, and interpretation, the research design used in this dissertation is best described as a 'fully-integrated mixed design', "in which mixing of [qualitative] and [quantitative] approaches occurs in an interactive… manner at all stages of the study" (Teddlie & Tashakkori, 2009, p. 156).

Figure 4.2: Fully-Integrated Mixed Research Design



The first main question of how laypeople construe the popularity of academic theories required qualitative discussions with laypeople, which were collected through semi-structured interviews including repertory grids, which are uniquely appropriate tools for eliciting constructs. The repertory grids also supplied quantitative data for the second main research question, relating perceptions of popularity to diffusion. This question required a sample of academic theories, which were measured for their initial diffusion using secondary data collection from Google Trends. This sample of academic theories also functioned as elements construed in repertory grids. The theories' initial diffusion values were then embedded within the grids after the interviews, so that the

relationship between diffusion and construct ratings could be quantified. Quantification took the form of a cluster analysis, numerically representing the similarity between grid elements and grid constructs. Qualitative coding of interview responses, construct descriptions, and construct clusters provided deeper understanding of diffusion-construct relationships and laypeople's perceptions of academic theories. Finally, an analysis of variance responded to the subsidiary research question concerning differing levels of diffusion across academic domains. All analyses were interpreted on their own and then together to provide a holistic response to the main research questions.

4.4 Methods: Measuring Diffusion with Google Trends

4.4.1. Sample

The sample for this component of the research was academic theories, selected by quota sampling thirty theories in three academic domains: physical sciences, social sciences, and the humanities, (n = 90). The domain of a theory was decided according to its discipline of origin (see Appendix 2 for how theories and disciplines mapped into domains). Inter-domain theories were excluded. Theories about the arts were included under the humanities, as they became the subject of language, literature, history, or philosophy (Levi, 1983).

Theories were sampled from the Library of Congress (LOC) subject headings and topics, a widely used, large index of all disciplines used in most library collections (Kwan & Chan, 2010), therefore containing a plethora of scholarly theories, including those that had not necessarily diffused beyond academia. By searching for 'theory', some theories (such as climate change) may have been inadvertently excluded, but ideas that information scientists had already classified as theories were more efficiently identified.

Theories were briefly researched to ensure they met the study's definition of theory as 'an idea that attempts to explain, predict, or understand some aspect of the universe', in line with the earlier descriptions of theories. Theories were further limited to 'academic theories' on the basis that they were discussed in academic research,

measured as theory terms with a minimum of 100 publications in Google Scholar (a catalogue of academic work comparable to major competing databases (Bakkalbasi, Bauer, Glover, & Wang, 2006; Kousha & Thelwall, 2007)).

4.4.2. Google Searches as an Indicator of Diffusion

Google Trends is a relatively new tool, which returns the number of searches completed in Google Search for a set period and place. So far, academics have linked the results from Google Trends to predictions of consumer purchases (Vosen & Schmidt, 2011), the spread of diseases (Cho et al., 2013; Kang et al., 2013; Valdivia & Monge-Corella, 2010), issue salience in upcoming elections (Mellon, 2014), and technology adoption (Jun, Yeom, & Son, 2014), demonstrating its range of potential uses. Within this study, Google Trends data was used to indicate initial diffusion. As discussed in more detail under 'Stages of Diffusion', during the knowledge and persuasion stages of diffusion, adopters seek out information in order to reduce uncertainty about an innovation (Rogers, 2003). Thus, information seeking indicates that the potential adopter has become of aware of the theory and is beginning to form perceptions. Since Google Trends measures how often people searched for particular information, it constitutes a theoretically valid measure for an information-seeking indicator of initial stages of diffusion.

Google Trends data was limited to Canadian searches, however, could not be limited to laypeople. This was not problematic since experts are also part of the diffusion process; like Rogers' (1983) 'innovators', experts may be the first to be aware of or adopt an academic innovation. Academics using Google still sought general information on specific topics (Miller, 2011), reinforcing that Google is used to build basic knowledge, as opposed to mastery of expertise.

It is also important to note that Canadians using Google are generally younger, more often post-secondary educated, and white collar, but Google's overwhelming market share (Beauchesne, 2014) makes it the more generalizable database. Google Trends offers unparalleled data on search activity, which in comparison to collecting data

manually, included a larger population, required fewer resources, and captured real actions rather than self-reported ones. Google Trends is an innovative data source for initial diffusion, since no other measures of the diffusion of academic ideas are known.

4.4.3. Procedure

Variations in theory terms were included and checked for whether they validly represented the content being sought (see Mellon (2014)). Problematic terms were removed, or if irremovable, the data point was entered as missing.

Google Trends provided weekly measures of searches for the five-year period between January 2010 and December 2014 for up to five theory terms, relativized to all terms and time points. To overlap scales for multiple theories, five theories were entered simultaneously (one the same as in the previous round). The average for each theory was then multiplied by the ratio of the current maximum point of the theory used in the previous round to the previous value of the same point amongst the previous set of theories, iterative for all subsequent rounds.

4.4.4. Inclusion in Repertory Grids

The Google Trends measure was added as an additional construct to individual repertory grids after being mapped on to an ordinal scale of 1 to 5 in order to match the rest of the grid data[1], and then labelled as '*scarcely known – widely known'*. See section 4.5.2 for details of how the measure was included and analyzed.

4.4.5. Descriptive Analyses

Descriptive results of initial diffusion were produced, including frequencies for all theories, as well as the geometric means and standard deviations for each domain.

[1] Continuous diffusion measures were transformed on to an ordinal scale based on the following mapping: 0 to 1, 1–15 to 2, 16–100 to 3, 101–199 to 4, and 200+ to 5, on the basis that five categories were needed, theories with zero values (no measurable diffusion) might be qualitatively different from theories with non-zero values (some measurable diffusion), and categories should contain roughly equal observations (Pasta & Francisco, 2009).

4.4.6. Analysis of Variance

ANOVAs are compatible with constructionism, as they explain how people interact with theories without reducing the relationship to a predictive or constant one. ANOVAs test whether the mean of any one group is significantly different from the mean of all the groups (Field, 2009), in this case, the three academic domains of physical sciences, social sciences, and the humanities. Using SPSS 22, a one-way ANOVA calculated whether domains had significantly different initial diffusion, and a Bonferroni post-hoc test revealed any additional differences.

4.4.7. Measures

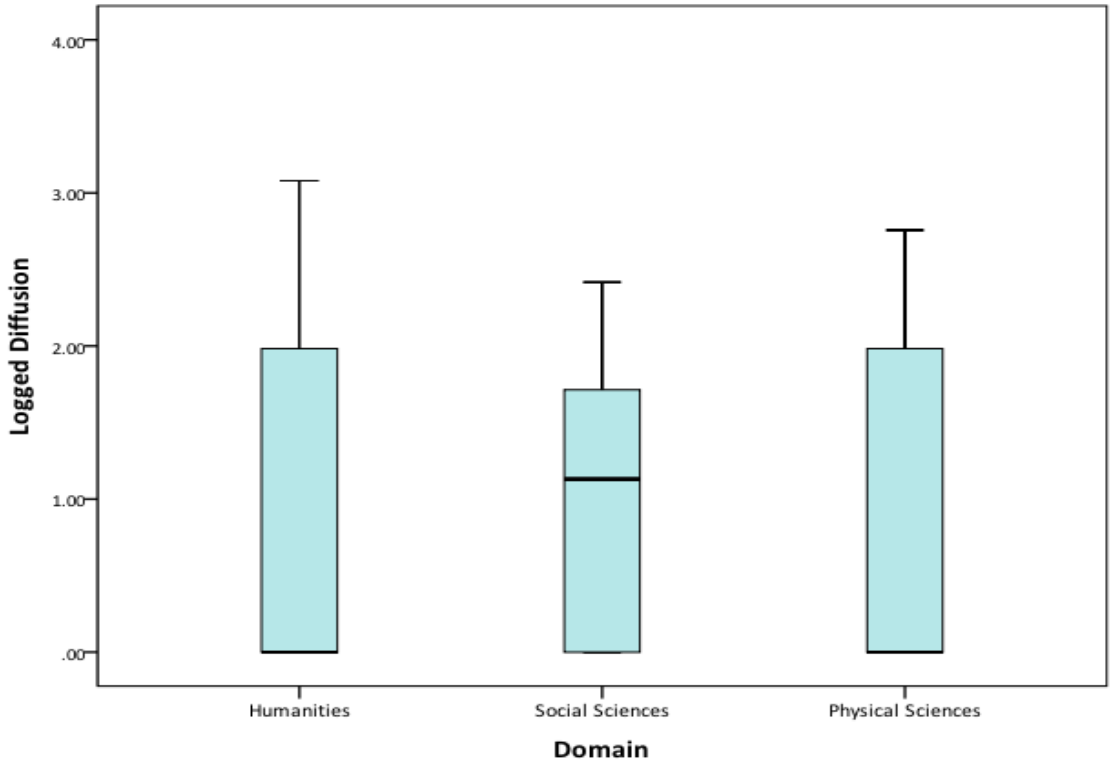
The dependent variable (DV) of initial diffusion exhibited values above zero on a continuous scale. The single independent variable (IV), domain, categorized theories as belonging to physical sciences, social sciences, or the humanities, outlined in Appendix 2. Domain was therefore nominal.

4.4.8. Data Cleaning

After reviewing theory terms for validity in meaning, five values for diffusion were missing, two of which were kept since as zero-values no measurable searches occurred for the academic theory *or* what it was confused with. For the remaining three missing values, a Pearson Chi-square test demonstrated that they were not concentrated to a particular domain, $\chi^2_{[2,\ n=90]} = 1.694$, $p > 0.1$, and an independent t-test showed that the reported invalid values did not differ significantly from reported valid values, $t_{[4]} = -1.0$, $p > 0.1$ (equal variances were not assumed). Unrelated to the DV or IV, data were therefore Missing Completely At Random (MCAR) (Enders, 2004, 2010; Howell, 2008), so the three values were replaced without concern for bias. A stochastic regression model imputed the missing values based on the mean and a random residual to maintain variability, an appropriate replacement technique when the patterns of missing data are simple (Enders, 2004).

A log transformation was applied to the DV because it represented the multiplication in diffusion from one theory to the next, which was better represented by a geometric mean. After transformation there were no discernable outliers for any of the domains, as judged from the boxplot in Figure 4.3.

Figure 4.3: Boxplot of Initial Diffusion by Domain



4.4.9. Assumptions

For an ANOVA to be an accurate measure of differences between group means, several assumptions must hold true: the DV is continuous; the IV is nominal; groups have independent observations and data; each group exhibits a normal distribution; and variances within groups are homogenous (Field, 2009). As discussed, 'diffusion' (and its logged transformation) was continuous, and 'domain' was nominal. The value for each theory was discrete from other values, so observations were independent. Diffusion for each of the three domains was significantly non-normal according to the Kolmogorov-Smirnov test, appropriate for larger samples (Field, 2009), shown in Table 4.3 on the next page.

Table 4.3: Tests of Normality

Domain	Kolmogorov-Smirnov Test		
	Statistic	df	Sig.*
Humanities	0.356	30	< 0.001
Social Sciences	0.208	30	0.002
Physical Sciences	0.372	30	< 0.001

Estimated using SPSS 22.
* Results of $p < 0.05$ are statistically significant, indicating that the variable is not normally distributed.

Even though the data was non-normal, so long as the groups were equal in size, the ANOVA was robust to the violation of normality, and so could still be used to calculate group differences acceptably (Field, 2009; Glass, Peckham, & Sanders, 1972). Finally, Levene's test was not statistically significant, $F(2,87) = 1.022$, *ns,* so variances across domains were homogenous.

4.4.10. Research Question and Hypotheses

The ANOVA investigated 'how does the geometric mean of initial diffusion vary across domains?' Possible responses to this question included the null and alternative hypotheses:

H_0 = There is no effect of domain on the geometric mean of initial diffusion;
$\mu_{Humanities} = \mu_{Soc.\ Sci.} = \mu_{Phys.\ Sci}$

H_1 = There is an effect of domain of the geometric mean of initial diffusion;
$\mu_{Humanities} \neq \mu_{Soc.\ Sci.} \neq \mu_{Phys.\ Sci}$ (or some combination)

A standard level of $p < 0.05$ was used to determine which hypothesis to accept.

4.5 Methods: Semi-Structured Interviews & Repertory Grids

Semi-structured interviews included several open-ended interview questions, as well as a structured set of questions related to repertory grids.

4.5.1. Sample

Fifteen Canadian laypeople were sampled. For the purposes of this dissertation, a layperson was considered to be a non-expert, without background knowledge or

training on academic theories (Scharrer, Bromme, Britt, & Stadtler, 2012), operationalized as people with an educational background that did not include completion of graduate study (which represented a period of developing specialized academic expertise).

Participants were quota sampled for three categories of educational background: high school education (n=5), college or trades education (n=5), and undergraduate university education (n=5). These strata increased the purposiveness and representativeness of the qualitative sample (Miles, Huberman, & Saldana, 2014), and allowed for comparison of perceptions of academic theories across education levels, as laypeople are not necessarily a homogenous group. Educational background was an important initial dimension of difference to explore, as indicated in Rogers' (2003) characterization of adopter characteristics. Canadian laypeople were further defined as those who also self-identified as being Canadian.

Participants were recruited using the communication software Skype, by inviting contacts populated from searches of Canadian Skype IDs. Response rates were very low (less than one in 100), meaning that participants were largely self-selecting. Another concern was online sampling's bias towards the young, better educated, and higher earners (Mellon, 2014), although it proved logistically advantageous for easily accessing participants from a variety of locations. A variety of age groups, genders, education levels, and cultural backgrounds were represented, though not distributed according to Canadian population demographics. Thus, while findings should not be generalized to all Canadian laypeople, they offer an important foundation for understanding perceptions of academic theories.

4.5.2. Procedure

The interview protocol was piloted with colleagues in order to ensure the questions and explanations were comprehensible. Interviews were individual, online audio calls lasting around 60 minutes, covering the participant's education, their opinions on the role and

qualities of academic theories, and completion of the repertory grid (see Appendix 3 for the Interview Protocol).

The Theoretical Basis of Repertory Grids

Repertory grids were often cited as one of the best ways to elicit constructs and meaning from people without the intrusion of the researcher's ideas (see Zuber-Skerritt, 1987). As such, they have been applied to a staggering range of topics, including religion, retail stores, holiday destinations, and relationships (Fransella, Bell, & Bannister, 2004; Pike, 2004). Within education, repertory grids were used by Zuber-Skerritt (1987) to study constructions of effective research and similarly by Bezzi (1999) to study science disciplines. While no previous research used repertory grids to study academic theories specifically, grids were used for related comparisons of academic disciplines, and their exploratory nature made them ideal for eliciting characteristics of a largely undefined topic.

Repertory grids were initially designed by Kelly (1955) as a way of eliciting his patients' implicit theories about the world. In line with a constructionist viewpoint, Kelly (1955) portrayed mankind as scientists making hypotheses, evaluating evidence, and developing theories in order to better predict and control the world. This is an unarticulated psychological process of creating templates, which he called 'constructs'.

For Kelly (1955), constructs are the essential building block of perceptions, defined as the "way in which some things are construed as being alike and yet different from others" (p. 105). Thus, constructs by nature express a dichotomy, not always as strict set of opposites like 'attractive – unattractive', but a nuanced contrast showing how the individual understands the construct, such as 'attractive – boring'. Public constructs can be shared by a group of people, "with repeatedly demonstrated predictive implications and often rehearsed meanings" (Fransella, Bell & Bannister, 2004, p. 10). To be compatible with personal construct theory, constructs should be elicited from

individuals within the group before creating a composite set of constructs (Fransella et al., 2004).

Elements are the 'things' – people, events, feelings, objects, et cetera – that constructs apply to, the parts of reality that are interpreted by the constructs (Kelly, 1955).

The Repertory Grid Instrument

Elements and constructs are the main components of the repertory grid. In this study, participants chose six elements (academic theories) according to a pre-set schema of two physical sciences theories, two social sciences theories, and two humanities theories. Participants selected theories from a list – the same sample of theories described in section 4.4.1, but with a measured diffusion over zero to ensure that participants recognized the theories, increasing the meaningfulness of elicited constructs.

Participants then generated constructs using a monadic method, whereby they first discussed a characteristic of one element – a reason why they believed the theory was (un)popular – then contrasted that characteristic with another element, and in doing so described the opposing characteristic. For example, a participant may have described Theory 1 as popular because it is 'construct 1a', perhaps 'in the media'. When asked to elicit a contrast, she may have said Theory 3 is different from the idea of 'construct 1a', because instead it is 'construct 1b', perhaps 'known from school'.

The monadic method was appropriate, since Fransella and her colleagues (2004) noted that there is no reason to hold to the traditional triad approach (three elements are presented at once) and it is unnecessarily complicated. The term popularity was used instead of diffusion for its less formal character and its ambiguity, similar to diffusion in that it could be interpreted to mean popular to the individual, groups, or societies, as well as awareness or acceptance.

Once the bipolar construct was elicited, it was noted in the repertory grid as a set of two poles: the similarity pole and the contrast pole (see Figure 4.4 on the next page). The elicitation of constructs continued until no new constructs were produced or constructs had been generated based on each of the six elements, whichever happened first.

Several standard constructs were also added: 'advantageous – disadvantageous', 'compatible with my beliefs – incompatible with my beliefs', 'complex – simple', and 'observable – hidden', innovation attributes outlined by Rogers (1983) and part of the DoI conceptual framework. Supplied constructs are important for constructs of theoretical consequence unlikely to be elicited, and are not detrimental so long as they are meaningful to the participant (Fransella et al., 2004). As such, the fifth attribute of trialability was omitted, as pilot interviews showed it to be difficult to interpret.

Figure 4.4: Repertory Grid Example

Similarity Pole 1 ←	Physical Sciences		Social Sciences		Humanities		Contrast Pole → 5
	Theory 1	Theory 2	Theory 3	Theory 4	Theory 5	Theory 6	
Construct 1a	1	1	5	3	2	4	Construct 1b
Construct 2a	4	4	3	5	2	1	Construct 2b
Construct 3a	2	4	4	5	3	1	Construct 3b
Construct 4a	5	1	2	3	5	4	Construct 4b
Advantageous	3	2	2	5	5	1	Disadvantageous
Compatible with my beliefs	2	1	2	1	4	3	Incompatible with my beliefs
Complex	2	3	1	3	4	5	Simple
Observable	3	4	3	4	2	4	Hidden
Scarcely Known	3	5	4	3	5	5	Widely known

Lastly, all elements in the grid were rated based on each of the constructs; the low end of the 5-point scale corresponded to the similarity pole and the high end to the contrast pole, while middle numbers represented a gradation. For example, all six theories would be rated between 1 and 5, with 1 representing 'appears in media' and 5 representing 'known from school'. The completed repertory grids are found in Appendix 4.

After the data was collected from the participant, '*scarcely known – widely known'* was added to the grid, rated according to external data from Google Trends, transformed on to an ordinal scale of 1 to 5 (refer back to section 4.4.5). Including this measure allowed for the association of constructs of academic theory popularity with initial diffusion. Even though including an external measure in repertory grids departed from the personal construct philosophy, the construct was familiar to participants (often explicitly a part of the discussion around theory popularity), and cluster analyses of the grids only tested to what extent it was associated with other elicited constructs. Thus, the measure was not unduly imposed, but was inserted in order to find out how related it was to other constructs.

4.5.3. Descriptive Analyses of Grids

Descriptive analyses included the frequency of repeated elicited constructs, creating a consensus view, since individual grids can together be summarized for an understanding of the group (Harri-Augstein & Thomas, 1978; Winer & Vázquez-Abadi, 1995).

4.5.4. Cluster Analyses of Grids

Cluster analyses of individual constructs and elements (separately), grouped those that were closely related to one another. Hierarchical clustering was computed using OpenRepGrid (Heckmann, 2014), according to the Ward method – a relatively efficient means of clustering (Burns & Burns, 2008) whereby constructs or elements are continually merged so as to add the least variance within a cluster (Field, 2000). Next, clusters of constructs were defined according to a cut-off height of four, so any links above a height of four were divided into separate clusters. This cut-off height produced

a reasonable number of clusters with meaningful numbers of constructs, as suggested by Holland (2006), across all participant grids. Since the ranging number of elicited constructs affected the height of element clustering, a cut-off height of 'the number of constructs in the individual's grid divided by two' was used.

Once construct clusters were demarcated, they were qualitatively analyzed, named as broader categories for their component constructs (Field, 2000), then coded into broader themes, as demonstrated by Harri-Augstein and Thomas (1978) and ultimately supported by Tan and Hunter (2002).

4.5.5. Memoing and Coding of Qualitative Data

The analysis of the interview data occurred in five stages: summary memos, descriptive coding, deductive coding, inductive coding, and thematic coding. Summary memos and jottings noted important descriptive and analytic ideas from the interview. Descriptive coding marked the education level, subject background, profession, and gender of the participant. Deductive codes identified concepts related to the DoI innovation attributes, as well as characterizations of academic theories or domains (see Appendix 8 for the coding framework). Inductive coding was done *in vivo* to keep concepts in the words of the participant, particularly important for a constructionist study focusing on the voice of participants (Miles et al., 2014). Finally, thematic coding aggregated like codes into smaller categories and themes (Miles et al., 2014). A thematic cross-case analysis was also employed to compare conceptions of academic theories across groups with different education backgrounds.

4.6 Triangulation

One of the benefits of a mixed methods design was the ability to triangulate findings through "the combinations and comparisons of multiple data sources, data collection and analysis procedures, research methods, investigators, and inferences" (Teddlie & Tashakkori, 2009, p. 27). By integrating methods and analyses, each research question was answered by multiple sets of findings, revealing greater detail and complexity,

verifying the agreement of different findings, and ultimately increasing assurances that findings were correct.

4.7 Ethical Considerations

The topic investigated was not particularly sensitive in nature, but due consideration was given to the ethical treatment of participants, who were given the option to use aliases to protect their identity (although most declined), and whose personal information was safeguarded. See Appendix 1 for proof of ethical approval.

4.8 Summary

Rooted in a constructionist perspective and a mixed methods methodology, this study sought to answer questions concerning Canadian laypeople's perceptions of the popularity of academic theories, and how those perceptions related to initial diffusion. Google Trends was used as a measure for initial diffusion of 90 academic theories from the LOC subject database. Differences in initial diffusion across domains were analyzed with an ANOVA. An ordinal transformation of the Trends data was included in repertory grids in order to quantify the relationship between initial diffusion and constructs of academic theory popularity using cluster analyses. Qualitative coding of clusters and interview responses produced cross-case themes of how laypeople thought about the popularity of academic theories. Although complex, the integrated methods were innovative, suited to the research questions, and allowed for triangulation of findings.

Laypeople's Perceptions of Academic Theories

This chapter responds to the first main research question of how Canadian laypeople perceive academic theories, by presenting how lay participants described academic theories, constructs that were repeated by multiple laypeople, and themes that emerged from cluster analyses of constructs. These broad depictions of how laypeople construed academic theory popularity are followed by comparisons of elicited constructs and understandings of academic theories for educational groups, and finally how laypeople depicted academic domains and how these domains were related in cluster analyses of elements.

5.1 How do Canadian laypeople construe the popularity of academic theories?

5.1.1. Nature of Academic Theories

Participants consistently depicted academic theories as interpretive lenses, "a way to interpret" that "helps understand things", or "richer points of view". These lenses were considered both rich ways to look at the world and views that one could get too set in:

> [My academic friends] have their worldview, and they can be surprisingly oblivious. But then at the same time, I think people need more rich lenses through which to view their world. It's hard to say, I have a love/hate relationship with academia. – Aaron

Once fixed, theories were reflective of a "mindset", and any change required a shift in perception. Neal understood this as "a bit too much" for the layperson, but nonetheless was needed for open-mindedness:

> I guess the idea is factual, but again they are theories, and I'm open to any explanation. I'm not one to be stuck on a certain idea. I have ideas obviously and I'm basing everything off my ideas right now, but they're always open to change. So the big bang theory is what I accept right now, but I don't necessarily think it is what took place. – Neal

The term theory in almost all cases was synonymous with something unproven, something "iffy", "speculated", or containing "elements of doubt". Some theories might

"get stuck" and never develop, but others would go on to become "fact". As Maria said, "theories are just theories, they're not proven yet".

Attitudes divided quite starkly and equally between laypeople who regarded theories as valid and important, and laypeople who regarded theories as irrelevant. The first group thought, at worst, academic theories "couldn't hurt" to know, and at best

> it's the only thing that is valid and the only thing that actually matters – Trennick.

On the other end, participants who understood academic theories as irrelevant, at best described that academic theories weren't thought about; at worst, theories were pointless:

> Well theories are wonderful, but theories in and of themselves don't do much.… it makes for great cocktail conversation, but it has very little practical use unless its applied. Theory in the world of academia is wonderful, it's great stuff to talk about, it's great stuff to learn about, but unless action is taken, regarding certain things, nothing changes.... It can do something, if the lessons learned in it are applied. And I'm not saying that they're not, I'm just saying that the theory in and of itself is just a way of understanding something, but it doesn't change anything. – Reg

For these laypeople, theories were doomed to remain intellectual anecdotes because they lacked application or were removed from real issues. Not all participants saw theories as devoid of having an effect on society:

> Academic theories have been the forefront of technological advancement. From the first century up to today, wouldn't have been without academic theories. From way back – Galileo, Faraday, Einstein – without these academic theories there wouldn't have been revolution in medicine, in communication. So for me, academic theories are more relevant to everything. – Alabi

Others understood theories to be more implicitly embedded in society, shaping it through intellectual-cultural revolutions, fostering tolerance, preventing errors, guiding actions, or building appreciation.

After being asked what role they thought academic theories should play in society, most participants (n=6) responded theories should better understanding, or as Mike indicated, "just to keep people informed and give people knowledge". This intrinsic purpose was close to personal and social purposes of opening up choices or perceptions

(n=2), augmenting civic criticality (n=3), and informing decision-making (n=3). Only one participant saw theories as needing to manifest into something tangible and applied.

When considering the importance of knowing about theories, a few participants described how learning more about the theory would require them to "sit down and study", but most expressed that often a basic level of knowledge was enough:

> I think knowledge is great and people should have more of it. I understand lives are busy and other things take precedence, I think it's generally a good idea to have in mind, because theories don't go away.... So it's good to know generally, but you don't have to know it in-depth. – T

All participants expressed at least some care for or interest in academic theories, but in tension with uncertainty regarding how much effort to invest to know them fully.

5.1.2. Constructing Academic Theories

In considering why certain theories were popular, laypeople came up with a variety of constructs. Several that emerged repeatedly are listed in Table 5.4 below.

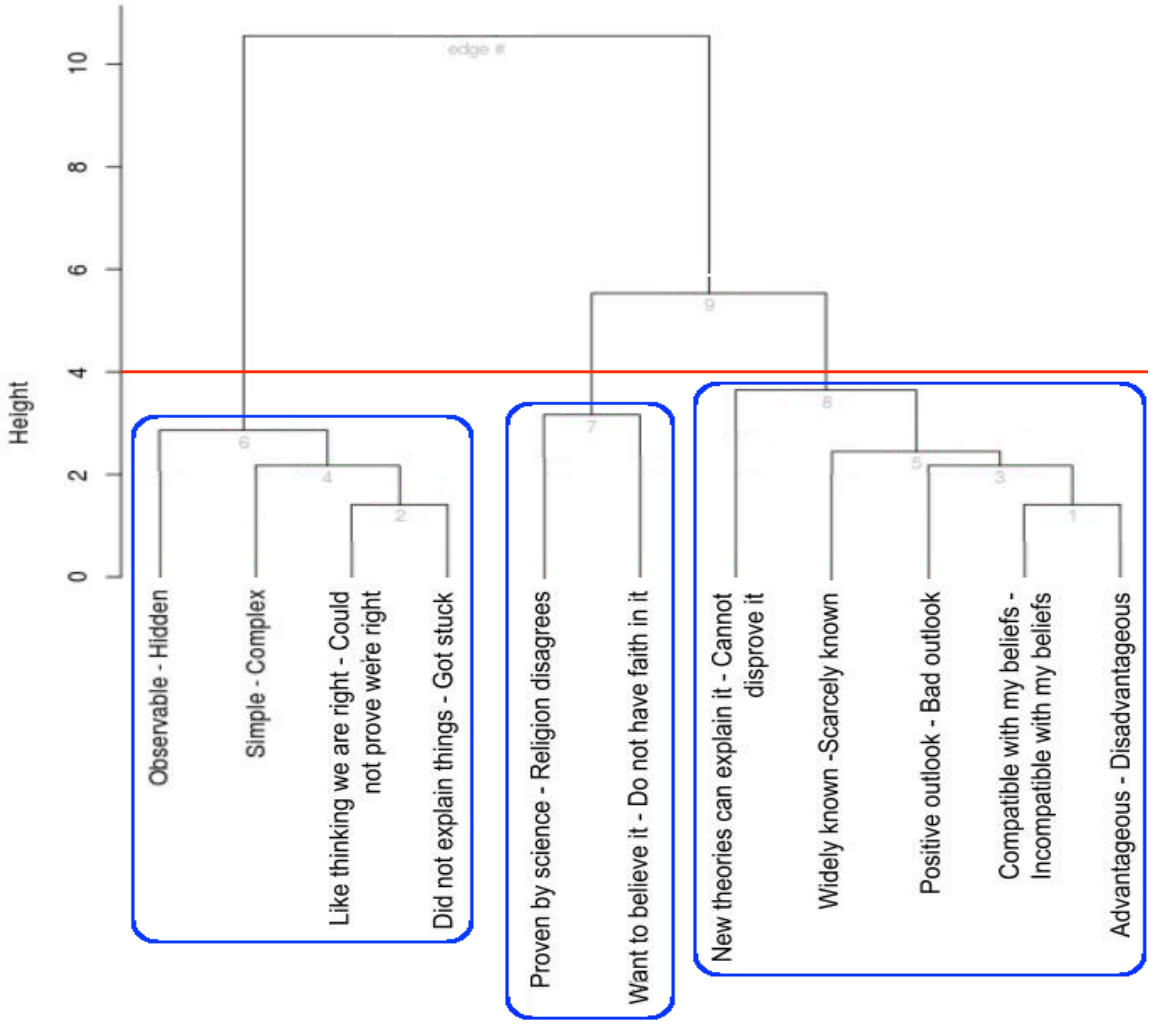
Table 5.4: Repeated Constructs

Construct	Contrast	Frequency
Physically/scientifically proven	No concrete proof	10
Religious element	A-religious	7
Media channels	Academic source / not in media	6
Personally beneficial	Less beneficial	5
Controversial	Little argument	5
Cultural belief	Lack of belief	5
Explains our origins	No wonder for created world	4
Interesting	Not of interest	4
Taught in general education	Outside of general education	4
Well accepted	Not accepted	4

To better understand how constructs related to other constructs, cluster analyses (explained in section 4.4.8) related constructs by connecting them with branches in a tree diagram. More related constructs are connected lower in the tree. One such construct tree diagram, Figure 5.5 on the next page, shows Paul's constructs grouped

into three clusters, circled in blue. One cluster contained constructs of observability, complexity, proof, and explanation, which together depicted the dimension 'provable explanation'. In a second cluster, theories Paul saw to be at odds with religion were related to theories lacking faith, together summarized as the dimension 'belief'. In the last cluster, theories Paul understood as unexplained by new theories, good outlooks, compatible with his beliefs, and advantageous, were closely related to theories with higher initial diffusion, coded as 'beneficial explanation'. Thus, for Paul, 'provable explanation', 'belief', and 'beneficial explanation' were important for his interpretation of theory popularity. The construct tree diagrams for the remaining participants are included in Appendix 6, and cluster analyses in Appendix 7.

Figure 5.5: Paul's Construct Tree Diagram



Thematically coding the clusters for all participants resulted in cross-case themes (roughly in order of frequency) of 'nature of discussion', 'physically verifiable', 'benefits', 'explaining something meaningful', 'acceptance of the best knowledge', 'understandability', 'scientific proof', 'religious belief', and 'applied use', as detailed in Table 5.5 below. Many of the cluster themes were similar in meaning to repeated constructs, adding to the reliability of the findings: physically/scientifically proven with scientific proof; religious element or cultural belief with religious belief; media channels or controversial with nature of discussion; personally beneficial with benefits; explains our origins with explains something meaningful; and well accepted with already accepted as best knowledge.

Table 5.5: Cluster Themes

Theme	Component Clusters
Nature of Discussion	'Wide controversy', 'suppression/discussion', 'open for discussion', 'following', 'entertainment', 'implicit awareness', 'drive for curiosity', 'publicize', 'debate', 'source of knowledge'
Physically Verifiable	'Empirical', 'believe what you see', 'can experience', 'obviousness', 'observability', 'viewable records', 'verification', 'know the physical', 'empiricism'
Benefits	'Believe in the beneficial', 'beneficial abilities', 'real benefits', 'beneficial explanation', 'know what's beneficial', 'motivated interest', 'solution', 'affective motivation'
Explains Something Meaningful	'Reassuring explanation', 'answers meaningful questions', 'greater purpose', 'deeper meaning', 'explains world', 'human interest', 'personal scope', 'more than simple explanations'
Already Accepted Best Knowledge	'Structured knowledge', 'positivist education', 'believe facts', 'know what's best', 'know what's good', 'know what's beneficial', 'believe truth', 'believe what's best', 'age', 'social pressure', 'well-established'
Understandable	'Complexity', 'understandable truth', 'relatable truth', 'can experience it', 'pre-requisite knowledge', 'accessibility', 'clearly relatable'
Scientific Proof	'Secular science', 'true science', 'evidence', 'provable explanation', 'hard truths', 'scientific truth'
Religious Belief	'Religious popularization', 'religion', 'religious controversy', 'beliefs'
Applied Use	'Direct use', 'technology', 'manifest to progress'

Thus, the major ways in which laypeople thought about the popularity of academic theories included the type and level of discussion surrounding the theory, whether it could be physically verified as true, various related benefits, whether it explained something of significance, whether it was already diffused (indicating that it was the best available knowledge), whether it was understandable, what scientific proof it had, what religious beliefs it affected, and what uses it could be applied to.

5.1.3. Discussion

The ways in which laypeople understood academic theories and their popularity were complex and varied. Academic theories were depicted as interpretive lenses, coinciding with the academic depictions of theories in section 2.3 as representations of a reality, and confirming Kelly's (1955) functions of lay theories as ways of making sense of the world. The key theme 'explaining something meaningful' and the related construct of 'explaining the origins of humanity' indicated that laypeople differentiated theory popularity more by the importance of their topic than the breadth of their scope.

The unproven nature of academic theories was seen as temporary, a necessary step on way to becoming factual truths, resembling the scientific version of theories put forward by academics and Ontario secondary school students. The construct of 'physically/scientifically proven' and the cluster theme of 'scientific proof' further demonstrated laypeople's tendency towards scientific accounts of theories.

Contrary to a knowledge deficit model, laypeople did not see themselves as lacking knowledge. Laypeople instead implied they were kept in the dark from theories that hadn't yet made it to their awareness, depicting themselves as the passive receivers of awareness and information related to academic theories. Repeated constructs and cluster themes suggested that for laypeople 'the nature of the discussion', in particular the communication of chiefly 'controversial' theories through mass 'media' or 'general education', influenced what they became aware of, echoing Larsen's (2011) assessment of the contextual forces shaping individual perceptions. Societal influence on diffusion

was more explicitly referenced in the cluster theme 'already accepted best knowledge', as it showed that what was already accepted in society was assumed to be the best theory. More attention should therefore be paid towards communicating a broader range of basic ideas to redress institutional and social barriers.

Discernable tension existed between the value of theories as 'blue skies' abstractions and concerns that theories would not result in meaningful change for non-academics, revealing one aspect of laypeople's 'love-hate relationship' with academic theories. Despite this contrast, almost all participants understood the role of academic theories as something internal and psychological. The 'applied use' or 'benefits' of theories were not always something physical or tangible, offsetting an idea of knowledge as economic capital. But a transition from awareness to action was nevertheless critical for many laypeople, implying an outlook more in line with public good and social justice aims for knowledge.

5.2 How do perceptions of academic theories vary between laypeople with different educational backgrounds?

Individual differences in constructions of academic theories were evident, but which of these differences could be attributed to educational background? By grouping statements on the nature of academic theories according to educational strata, several trends became evident. (Note that quotations are not credited in order to maintain the confidentiality of participants' educational backgrounds).

Laypeople with comparable education backgrounds were reasonably similar in how they understood academic theories as ways to interpret the world, continually developed, and not yet proven. Each group exhibited similar differences in whether academic theories were well regarded or questioned as irrelevant.

Laypeople with a university education more often described learning about academic theories as an explicit process that took effort and attention. In contrast, the groups of

high school and college participants depicted an implicit awareness that came through recognizing the theory topic or speculation:

> It's a subconscious thing because I don't necessarily strive to learn more about a specific thing, in this case theories. I'm not like 'you know, for the next two hours I'm just going to look up all sorts of different academic theories', but rather it just kind of comes to me, and I start wondering without even knowing, without being aware that I'm wondering about this particular thing.

High school respondents (and one college participant) also emphasized different levels of knowing, and how deeper levels of comprehension were only necessary for certain people:

> There are many people who love music, have an interest in music, but they don't play a musical instrument, or sing, or whatever, so they have little interest in the theory. Then there are those that do play a musical instrument or sing, but not at a serious enough level that they're interested in pursuing the theory side of it.

Despite deemphasizing the need for formal understanding, the group of high school participants more often expressed concern about knowing different theories:

> I care knowing about it as people talk about it frequently and I want to know what people are talking about. For example, when you were explaining some of the alternate theories, I wasn't aware of some of them, which I should have been, and it should be discussed more.

Having knowledge was thus an issue of access to social and political discussions, and to choice in what one believed.

Even though they desired to know and consider theories, the group of high school participants much more strongly emphasized how theories were just a part of an academic discussion or debate, which served no purpose and even degraded the value of theories:

> I mean if you take fifteen people that all study the same theory and put them in the same room, are they just going to come to a conclusion or are they just going to sit there and debate about it for the next ten years? And does that really help anybody? Because then it just becomes opinion almost.

In contrast, the group of university participants placed a positive weight on the social effect of theories:

> [Theories] help us keep our society, to shape our future. Some of them describe how people should act in society, what's normal. Basically they shift society, discuss who we are.

There was thus a considerable difference in how university- and high school-educated laypeople perceived the process of learning about academic theories, the importance of considering and knowing academic theories, and the impact of academic theories on society. The group of college participants was differentiable for emphasizing implicit awareness above formal learning, but otherwise echoed the sentiments of other laypeople.

Educational groups also exhibited some differences in their elicited constructs: college participants were the only group not to mention theories as being taught in school or in the media and laypeople with university undergraduate education were the main elicitors of constructs related to proof and media, as depicted in Table 5.6.

Table 5.6: Frequency of Elicited Constructs by Education Level

Construct	Contrast	High School	College	University	TOTAL
Physically/scientifically proven	No concrete proof	2	3	5	10
Religious element	A-religious	2	3	2	7
Media channels	Academic source/ not in media	2	0	4	6
Personally beneficial	Less beneficial	2	2	1	5
Explains our origins	No wonder for created world	1	2	1	4
Interesting	Not of interest	2	1	1	4
Taught in general education	Outside of general education	2	0	2	4
Cultural belief	Lack of belief	1	1	2	4
Well accepted	Not accepted	1	2	1	4

5.2.1. Discussion

Individual characteristics accounted for more differences in the constructions of academic theory popularity than educational background. Some differences that were differentiable by education included: emphasis on implicit versus explicit learning,

concern for attaining adequate knowledge, understanding theories as pointless conversations versus impactful, emphasis on theory communication, and emphasis on theories' proofs.

One constellation of particular interest is how laypeople with a high school background more often emphasized implicit awareness, highlighted concerned with having inadequate knowledge, and yet thought theoretical discussions were pointless. An interpretation based in the knowledge deficit model might argue that high school participants' 'implicit awareness' was insufficient to understand theories and their uses, but a society-in-science perspective would interpret that while they had less rigid definitions of knowledge, particular types of knowing were required to participate in certain social-intellectual activities that were not as easily accessible to them.

In contrast, laypeople with a university background stressed explicit learning and social impact, amidst references to media and proof. Again, a knowledge deficit model might propose that greater formal education produced deeper understanding of the evidence, effects, and communication of theories, whereas a society-in-science interpretation would put forward that socialization within a university context passed on more academic criteria for understanding and evaluating theories. For sake of brevity, judging which of the two interpretations better represents the reason for educational differences cannot be considered within this dissertation.

The less differentiable responses of college-educated laypeople might have indicated that they were neither as empowered nor as worried about discussions around academic theories as university or high school groups, which would also explain the absence of constructions related to communication channels.

5.3 How do perceptions of academic theories' popularity differ across domains?

How laypeople interpreted the academic domains of the humanities, social sciences, and physical sciences was of interest given the different nature of their theories and that constructions related to scientific proof were already suggested in earlier analyses.

5.3.1. Portrayals of Domains

Physical sciences were by far the most richly depicted domain, often used by laypeople as a way of describing academic theories. 'Scientific' was often synonymous with evidenced truth, through pairing with words such as "fact", "backing", "proof", or "consensus", by virtue of its observation of physical objects and pure reasoning:

> Rationalism I think needs to be the very purest form of logic and evidence, and the true science, where you take out all subjectivity and make it objective and just strip it down to results and evidence. – Maria

Laypeople referred to the growing cultural dominance of sciences, depicting the scientific perspective as the new status quo, as its apparent certainty provided little room for debate. Not all sciences were equal in this – 'soft' sciences were more creative and relaxed, whereas traditionally 'hard' sciences were seen as "higher", "more academic", and more empirical in nature. Arianna went so far as to say that

> you may associate it with nerd culture. For example, shows such as Big Bang Theory, show higher academic subjects as being in the realm of people who are socially inept or outcasts. So it looks like cognitive development may be one of those sciences where someone may think 'oh, its cool, I took a psych course'. But if you go on about what you learn in your higher physics class, people might look at you. – Arianna

The kind social division described by Arianna linked with several others' description of a separate community of science.

In contrast, social sciences were construed as a domain that shed light on the social nature of people. By virtue of this social perspective, social sciences were understood by many as affecting us, being used in society, or impacting our everyday lives. For some participants the effect was something occurring behind the scenes, beyond our immediate awareness, while for others it was direct:

> [Social sciences theories] more affect everyday lives, they affect the world in a greater way than the other two [domains]… The average person isn't actually directly affected by physical sciences or humanities, as much as they are social sciences. – Yakov

The humanities were largely depicted as a domain that understood the human condition – how we work, our nature, and our needs – making it closely related to the social

sciences. The perceived closeness of humanities to people made it more relatable, as well as a means for personal development, seen as a source of criticality and morality that could be used to improve oneself. On the other hand, Arianna understood the humanities to be more removed from reality, "a pursuit for those who have a lot of time on their hands, for the more academically minded". So although dominant, the perception of the humanities as a means to understand and improve humanity was not unanimous.

Some people thought that the nature of a domain was reason enough to encourage greater interest in that domain for all Canadians, but a few respondents emphasized that interest in a domain depended on the individual – their personality, their interests, their academic strengths, or whether they "understand or sympathize with the way the ideas are created".

Analyzing the differentiation of domains with cluster analyses of elements painted a less decisive picture. The results across the fifteen element tree diagrams (included under Appendix 5) are summarized below in Table 5.7. More inter-domain clusters existed than domain-specific clusters, by far. Social science theories were particularly disparate, as they were most often outliers from other theories, and less often clustered with other social or physical science theories. Humanities were most often interpreted alongside other domains. Physical sciences were the most independent domain, although boundaries were still very mixed.

Table 5.7: Clusters of Elements

Cluster Descriptions	Physical Sciences	Social Sciences	Humanities
Single theories	5	9	2
With Physical Science theories	**2**	4	9
With Social Science theories	4	**0**	9
With Humanities theories	9	9	**1**
With all three domains	5		

5.3.3. Discussion

The physical sciences were regularly portrayed according to a positivist and empirical framework; by purportedly looking for observable, physical evidence in an objective, rational manner, the physical sciences were given preferential status as truth. Such characterizations closely resembled scientists' own accounts of science, more than non-intellectual lay evaluations of physical sciences. As suggested by Roth and Lucas (1997), it is important to ask how and why laypeople employed this scientific discourse. An initial suggestion would be that the rational scientific framework is currently the culturally dominant paradigm due to its esteemed place in the knowledge society (Stehr, 1994), a social context that influences lay perceptions.

The same scientific paradigm was not applied to the social sciences, which were instead construed as an affective and people-oriented domain, in agreement with the literature on lay perceptions of social sciences. The difference with the literature however, was that laypeople perceived social sciences as having important impacts. The relevance of social sciences to everyday experiences did not necessarily lead to its rejection, as suggested by Furnham's (1988) explanation of how laypeople thought social sciences were just common sense, but rather gave it a privileged role in social change.

The humanities were similarly impactful, but on a more individual (as opposed to societal) level, tending more towards normative, moral effects, in line with the literature by academics on the nature of humanities theories as aiming to improve values, ethics, and meaning.

Even though domains were characterized differently, they were a small part of how laypeople rated the popularity constructs for academic theories. Domain boundaries between theories were blurred, although physical sciences seemed the most independent, recognizable domain, and social sciences more aberrant. It could be that domain differences were used as a discursive strategy for how some laypeople distinguished theories, but individual theories were not easily inserted into these

domain discourses. Overall, domains were important to characterizations of theories, but domain boundaries were by no means the most important way of organizing academic theory popularity.

5.4 Summary

Laypeople used a rich variety of ways to understand and evaluate the popularity of academic theories. While there were some differences across educational backgrounds, education was by no means an all-encompassing factor for how theories were perceived. Portrayals of physical sciences were especially important for how participants chose to discuss the nature of the academic theories and why they were (not) popular. However, physical science theories were seldom clearly distinguished from social sciences or humanities theories. In addition to domain, 'physical verification', 'understandability', 'benefits', 'explanation of something meaningful', 'the nature of discussion', 'applied use', 'scientific proof', 'religious beliefs', and 'acceptance of the best knowledge' were key themes by which laypeople perceived academic theory popularity. How these perceptions were related to the diffusion of academic theories is the subject of the next chapter.

The Diffusion of Academic Theories

Identifying how lay people perceived the popularity of academic theories was an important task in its own right. The process naturally engendered subsequent investigation of how their perceptions related to diffusion. This chapter responds to this topic by answering three sub-questions: 'does initial diffusion of academic theories differ by domain?', 'what constructs of academic theory popularity correspond to diffusion?', and 'do DoI innovation attributes match lay depictions of academic theories?'. The first question was investigated using an analysis of variance of theories' diffusion across domains; the second question through an interpretation of construct cluster analyses; and the third question with a qualitative analysis of laypeople's depiction of DoI-based innovation attributes.

6.1 Does initial diffusion of academic theories differ by domain?

Given the importance of domain in characterizing academic theories, both for laypeople and in academic research, it is important to consider the effect of domain on the initial diffusion of academic theories.

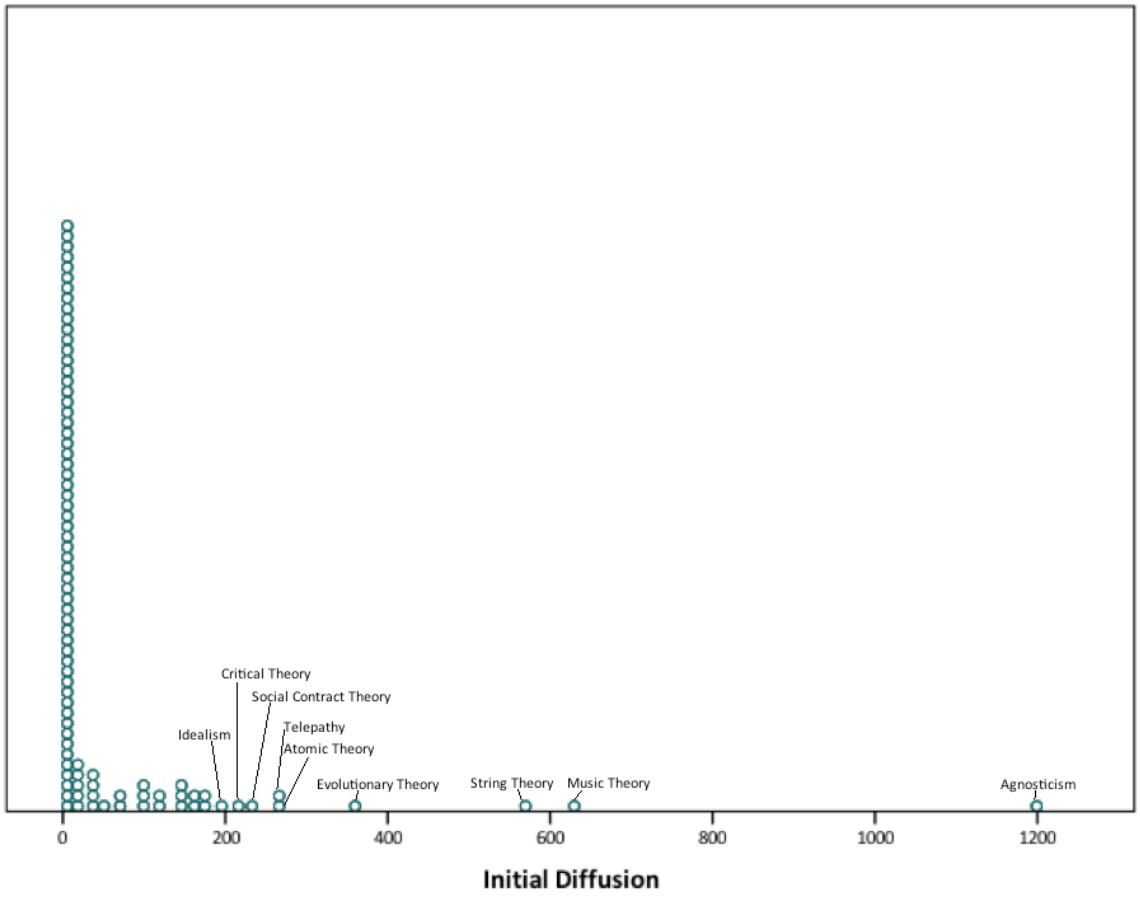
6.1.1. Descriptive Results

Out of a sample of academic theories (n = 90), over half (47) had a diffusion of zero, using normalized data collected from Google Trends. Figure 6.6 (on the next page) shows the levels of initial diffusion for all theories. Even the most searched theories were not widely diffused in the broader scheme of things; 'dishwasher' was searched seven times as much as the most searched academic theory (agnosticism), and 'horse' forty-four times more.

Using SPSS 22, the geometric means of logged diffusion across domains were calculated as: humanities, M = 0.74; social sciences, M = 1.01; and physical sciences, M = 0.65. The differences in geometric means meant the rate of increase between theories with no diffusion and more diffused theories was highest for the social sciences, followed by the

humanities, and then physical sciences. Whether mean differences were statistically significant was determined with an analysis of variance.

Figure 6.6: Initial Diffusion of Academic Theories



Note: the initial diffusion value indicates how many times more a theory was searched than the least searched theory.

6.1.2. Inferential Results

Domain did not have a significant main effect on the logged diffusion of academic theories, $F_{[2,87]} = 1.094$, $p > 0.1$; $\eta_p^2 = 0.025$. Domain only explained 2.5% of the variance in the logged diffusion of academic theories. The Bonferroni post-hoc test did not show any significant differences between pairs of domains, shown in Table 6.8 on the next page.

Table 6.8: Bonferroni Post-Hoc Contrast of Diffusion across Domains

Contrast	Mean Difference	Std. Error	Sig.
Humanities vs. Social Sciences	-0.269	0.256	*ns*
Humanities vs. Physical Sciences	0.097	0.256	*ns*
Social Sciences vs. Physical Sciences	0.366	0.256	*ns*

Thus, we can accept the null hypothesis that there is no effect of domain on the geometric mean of diffusion. In other words, the increase in diffusion between academic theories was not significantly different between the three domains, and had only a negligible effect regardless.

6.1.3. Discussion

Overall, the findings from the ANOVA demonstrate that domain was not an important societal-level factor in what makes certain academic theories more diffused (in initial stages) than others. So even though the humanities' described its social impact as occurring mainly through diffusion (see section 2.6.2), and even though the physical sciences were privileged in lay constructions of theories (see section 5.3.1), there was no notable difference in the initial diffusion of theories by domain.

The lack of importance of domain to the initial diffusion of academic theories could be due the difficulty of clearly differentiating individual academic theories by their domain (similar to why clusters of theories lacked distinguishable domains, as suggested in the previous chapter). Another interpretation might reflect the sentiment expressed in the previous chapter that individual differences in personality, interests, or beliefs guided Canadians' attention to a particular domain. So if similar numbers of Canadians were interested in each domain, domain effects at the national level would cancel out. Further investigation would be required to indicate which interpretation is most appropriate.

The descriptive results from Google Trends also pointed to the general lack of initial diffusion of academic theories: few academic theories were diffused to any measurable

extent, and even fewer were diffused enough to be noteworthy. The initial diffusion of academic theories is therefore lacking, to laypeople and even to academics.

6.2 What constructs of academic theory popularity correspond to diffusion?

Given that the initial diffusion of academic theories was largely unexplained by differences between domains, consideration of how other attributes related to diffusion became that much more important. Investigation of the relationship between elicited and standard DoI constructs with initial diffusion was a logical next step.

The diffusion construct 'scarcely known – widely known' (refer back to section 4.4.4 for an explanation of the data source for this construct) was often clustered with DoI innovation attributes. Specifically, the 'widely known' pole of the diffusion construct was clustered with 'advantageous' in seven tree diagrams, 'compatible with my beliefs' in four tree diagrams, and 'observable', 'simple', and 'complex' once each. The cluster analyses therefore suggest that lay interpretations of 'advantageous' and 'compatibility' were closest with initial stages of diffusion.

Elicited constructs clustered with 'scarcely known – widely known' were easier to interpret based on the label given to the whole cluster: 'beneficial and believed', 'following', 'suppression or discussion', 'religious popularization', 'motivated interest', 'open for discussion', 'knowing the physical', 'beneficial explanation', 'solution', 'know what's beneficial', and 'religious controversy', indicated the thematic prominence of 'benefits' and 'the nature of discussion' (cross-cluster themes identified in the previous chapter). Clusters without elicited constructs were those related to the theme 'acceptance of the best knowledge', equally noteworthy for its connection to academic theory diffusion.

6.2.1. Discussion

The clusters thematically coded as 'benefits', 'the nature of discussion', and 'acceptance of the best knowledge' demonstrated the closest correspondence with initial diffusion,

and are therefore important new ways of specifying the nature of academic theories as innovations. These dimensions are particularly curious in that they describe more of the social context of theories than the nature of theories themselves, lending empirical support to laypeople's and Larsen's (2011) emphasis on adopter's passive reception and socially influenced initial knowledge of academic theories. Although this interpretation is not conclusive, its implications on the social context of academic theory production and diffusion are massive.

From Rogers' (2003) innovation attributes, 'advantage' and 'compatibility' were particularly close to initial diffusion, matching his statement that relative advantage and compatibility were particularly important attributes for explaining innovation diffusion. Understanding what the relative advantage and compatibility of academic theories meant to laypeople specified the qualities of academic theories related to initial diffusion.

6.3 Do DoI's innovation attributes match lay depictions of academic theories?

Lay interpretations of DoI attributes were often closely related to the initial diffusion of academic theories, making it critical to discuss how their perceptions of these attributes compared to DoI literature.

6.3.1. Observability

Observation was almost unanimously interpreted as the ability to directly perceive the theory's object or evidence in a physically manifested form. Laypeople continuously emphasized seeing the theory happening, recording footage, being shown examples, looking at it, doing it, or quantifying it, as it allowed them to directly verify the reality of the theory:

> The process that happens is observable, it's right there in front of you. You can't exactly deny what's going on there – it's apparent. – Yakov

In contrast, theory topics that were internal rather than physical were understood as more obscure, and therefore less observable or certain. Two participants emphasized how the mind was hidden, preventing them from verifying the theory for themselves:

> It's not quantifiable, you can't physically see it, you can't hear it, many times people can't do [telepathy] in a sense, and so the people who claim to be able to do it, we have to take their word for it. – Neal

To a lesser extent, observation also referred to perception of the idea of the theory, in terms of recognizing, seeing, or making sense of the information.

6.3.2. Complexity

Complexity was consistently interpreted as the relative ease of understanding the theory, which ranged from being able to understand the concept implicitly to its being too difficult to "wrap your head around". For many laypeople, the ease of understanding something was a function only of the theory's complexity, but for others, there was an additional dimension for the level of understanding that was being sought:

> Being aware, I think it's important. But actually knowing them might be a bit too much for the typical person because of all the complications. I think it's good if the person knows the basics, but they don't really have to dig deep down into it, that just might be a bit too much for them. – Yakov

In this way of thinking, theories were simple or complex depending on whether basic or advanced knowledge was sought. For three participants, complexity also depended on the person; intellectuals, experts, scientists, or those with a greater IQ had a greater ease of understanding:

> Some of the sciences… people are just not going to be able to understand a lot of that stuff. If you have a 175 IQ, you're not going to be delving into that kind of thing. – Paul

Other factors associated with the apparent complexity of the theory included: particular subjects, such as the mind or people, theories with many components or events, the form of presentation, specialized wording or language, and the context in which complexity was being considered – the theory itself, its proof, its plot, its use, or its social controversy.

6.3.3. Compatibility

Belief was an attribute of theories often emphasized by laypeople, mostly in terms of religious beliefs. Many theories (especially scientific ones) were understood as affecting religious beliefs by virtue of putting forward an idea of the world that overlapped and conflicted with them in some way:

> Well the whole creation theory that religious people believe in kind of contradicts [evolutionary theory], so they're complete opposites. They battle against each other and it's been a battle really between two sides of what people believe in. – Maria

Reg was the only participant to propose that religious beliefs were not necessarily incompatible with scientific theories or that both could be true. Within the discourse of science versus religion however, physical sciences were often construed as beyond belief, where "beliefs were not in the way", although for a few laypeople it only provided a new set of beliefs. Beyond the juxtaposition of science and religion, theories were often depicted as clashing with each other, arguing, "bumping heads", and offering conflicting perceptions.

Laypeople often pointed out others' blindness to evidence that contradicted their beliefs, ranging from unconsciously lying to oneself to rejecting evidence outright:

> People are scared by that thought [of mortality]. They don't like it. They don't like the evidence, and therefore tend to reject it. Whereas any evidence that benefits theism, people tend to get behind that immediately. – Trennick

People unwilling to challenge their beliefs were portrayed as closed-minded, but also as motivated by the benefits that their belief offered, such as hope, happiness, comfort, tangible or practical benefits, and deeper meaning. Belief was understood as a central issue for several academic theories, although for many other theories belief went unmentioned.

6.3.4. Relative Advantage

The construct set 'advantageous – disadvantageous' was probably the least understandable standard construct for participants, with several of them posing the

question “advantageous to who?” For almost all laypeople however, ‘advantageous’ was interpreted as the direct, immediate benefits to themselves and/or society (never mutually exclusive), if the theory were adopted or true. A theory was generally perceived as advantageous if it would improve living in some way:

> The theory itself has more of a value to going about your daily life. The fact that we know that photosynthesis is a thing helps us grow plants, so the theory itself holds an intrinsic value to knowing, rather than some theories where they’re just there to describe a process that we observe and that’s it. – Jacob

Types of benefits were wide ranging, but always stressed helping, changing, or doing.

Theories that had greater explanatory power were also understood to be more advantageous. Explaining more about the world had the advantage of ensuring the theory was the best possible answer, and allowed for understanding of a bigger picture. As T said, “to me everything makes sense because of [music theory]”. Thus, advantage was connected to repeated constructs ‘personally beneficial’ and ‘explains our origins’, and cluster themes ‘benefits’ and ‘explains something meaningful’.

For some laypeople, the epistemology and structure of the theories was influential for why certain theories were adopted. Also, simple, original, and positive theories were perceived as better than theories lacking those qualities.

6.3.5. Other Attributes

Neal indirectly referred to trialability as how a particular theory embodied an ability or skill that could be tried out. Neal was also the only one to mention attributes of cost and profitability, as the requirement of time needed to learn about a theory and monetary value, respectively. The attribute of divisibility was not implied in any of the participants’ responses.

Communicability implicitly dealt with how easily the theory could be explained, ranging from “simple” to “hard”, “teachable” to “too difficult to learn”. Theories that were closely associated with their object by name (for example, music theory) imparted some

understanding of the theory just by their name, and so were considered more communicable:

> Just the name gives a part of what the theory is about, compared with string theory: 'string?, what are you talking about?' – Étienne

Communicability overlapped considerably with the attribute 'complexity' and the theme 'understandable'.

Although it was not mentioned frequently, two participants alluded to 'social approval' as how knowledge of or belief in certain (particularly accepted scientific) theories was important to their identity within their social group. Trennick suggested that if he didn't believe in lunar theory his position in the aerospace industry would be deeply questioned and Jacob stated that he wanted to know about scientific theories in order to "keep up" with his family.

More laypeople referred to the wider social 'image' associated with academic theories. For two participants, having some basic knowledge was a means of accessing conversations in which theories were discussed. For others, there was a more normative group effect, wherein certain theories were more taught and adopted, which subtly pressured individuals to adopt the same theory in order to fit in with society. Trennick described this process as "herd enforcement", where groups attempted to maintain the status quo response to a theory within their own group before expanding outwards. Arianna saw social influence occurring in the scientific world:

> …Perhaps status. If you believe in something that's deemed scientifically sound you tend to be supported, but if you believe in something that you can't really detect, then you tend to be cast aside. – Arianna

Scientifically sound theories were supported, and those who spearheaded them had higher social and intellectual status. Those deviating from scientifically sound theories, or those with less formal knowledge about them, were "laughed at" and rejected.

Although there were many theories for which voluntariness was likely a non-issue (and hence not mentioned), a sentiment of forced uptake of theories was expressed by

several participants. Implicit in terms like “tell us what the world is like”, “blindly follow”, “swallowing what’s been told”, “force it on you” or “herd enforcement”, was a definite sense that diffusion was automatic and adopters were compelled to accept the theory. The depictions above were active and even violent; others however expressed a more passive uptake, wherein the theory was just accepted without disputation:

> Well it didn’t make sense, but you just accepted it, because it’s just been talked about for so long. I don’t know when the theory was theorized, but it’s something that I’ve heard of growing up, and just never disputed it. – T

The enforcers in these descriptions included the rich, the law, religions, the government, and scientific education.

6.3.6. Discussion

The attributes of trialability, cost, profitability, and divisibility from core and extended DoI literature did not have a prominent place in laypeople’s perceptions of academic theories as innovations.

The interpretation of observable as the ability to view proof of the theory demonstrated alignment with the DoI notion of observation as observation of the innovation itself, but not as observation of innovation uptake. Ease of communicating the innovation, represented well by the cluster theme of ‘communicable’, was more related to complexity than observability for academic theories (contrary to Rogers' (2003) analysis).

Laypeople’s depictions of complexity closely resembled depictions of complexity in DoI literature, as the difficulty in understanding the innovation, dependent on expertise. The idea of complexity as ‘difficulty to use’ was not mentioned, perhaps because of the less clear ways that theories are used. Several more specific aspects of complexity were provided by laypeople, listed above.

Compatibility with beliefs was discussed in a broad social context more than on personal terms, often used as a way of discounting a religious perspective and justifying scientific

positions. More generally, considerations of belief compatibility included inter-theory clashes, since as interpretive lenses theories constituted the belief systems that new theories were then judged by, adding to the need for the DoI model to consider inter-innovation competition. Interpretations of compatibility were predominantly concerned with values; theories' practical compatibility with operational needs went unspecified.

Much like DoI depictions of relative advantage, 'advantageous' was mainly interpreted as tangible and immediate benefits, increasing the comparability of academic theories with other, even technological, innovations. Specifying what kinds of benefits theories offered, given that these were not often physical applications (as shown in section 5.1.3), would be important in subsequent research, as would attending to how the advantages of theories differed for various groups of stakeholders.

Social approval, image, and voluntariness were also important attributes that captured part of the social context of academic theory diffusion. Similar to the theme of 'existing acceptance of the best knowledge' from section 5.1.3, lay depictions of these attributes implied an intellectual hierarchy, wherein some epistemic paradigms had gained dominance, and therefore became a source of status and went relatively unquestioned. In conjunction with the interpretation of the social influence and passive receipt of theoretical knowledge in the previous section, these findings confirm social imbalance and need for lay voices in academic knowledge production, as laid out in the Introduction.

Although particular nuances deserve to be explored further, this initial mapping of lay conceptions of academic theories on to DoI innovation attributes demonstrated clear connections between them. These empirical findings validate the earlier theoretical argument for considering academic theories as innovations.

6.4 Summary

Academic theories can be characterized as innovations in much the same way as described by Diffusion of Innovations literature. As such, understanding how academic

theories are diffused presents a new model for considering lay perceptions of academic knowledges. This exploratory analysis laid out some initial findings that began to address how lay perceptions of academic theory popularity relate to theory diffusion: 1) at a national level, domains did not have a significant or large effect on diffusion, 2) relative advantage and compatibility were the innovation attributes (laid out by Rogers (2003)) most closely related to initial diffusion, 3) themes of discussion, benefits, and pre-existing societal acceptance were important to how academic theories were related to diffusion, and tentatively 4) social pressures influenced what theories laypeople were aware of and considered the best.

Even with the results from this study, there is still much more that we don't know that could be addressed in later research: the mechanisms for how lay perceptions influence diffusion; how lay perceptions are formed by an influential social context; whether domains are a factor for innovation awareness or adoption at the individual level; or what attributes are important for theory adoption or implementation. More avenues for additional research are listed in the concluding chapter.

Conclusion

Academic theories can be classified as innovations, since their representation by laypeople was consistent with innovation attributes from Diffusion of Innovations literature. Mapping academic theories into this framework, along with the establishment of a measure for initial diffusion, can serve to demonstrate the potential of 'basic research' and theoretical knowledge to affect wider society, renewing consideration of the social purposes of academic knowledge.

In descriptions of academic theories as innovations, Canadian laypeople used a complex and diverse array of constructs. Academic theories existed along spectrums, some positively related to popularity and others negatively related to popularity. Polarization of academic theories reflects the "love-hate relationship" expressed by Aaron (see section 5.1) and echoed across all participants, who demonstrated tensions in understanding theories as important and irrelevant, psychological lenses and observable phenomena, and intrinsically valuable truths and extrinsically beneficial applications. Thus, identifying constructs related to diffusion cannot result in a neat summary that 'because all academic theories are 'x' they are well diffused', but must instead draw attention to differences and contradictions between theories and participants. Nonetheless, broad attributes for how most laypeople thought about the popularity of academic theories included how and where theories were discussed, the benefits they offered, their existing diffusion indicating which theories were better innovations, as well as physical verification, understandability, explanation of something meaningful, scientific proof, religious belief, and applied use of the theory. These themes and similar constructs presented in section 5.1.2 represent a critical interjection of lay voices into discussions of academic knowledge evaluation and diffusion.

Now that there are attributes of academic theories as innovations, what should be done with them? I am not suggesting that this research be used to manipulate the form or content of academic theories to expand their diffusion among laypeople. Old concerns

for maintaining the quality and worth of academic versions of theories should be appreciated, and academic knowledges are not inherently superior to other knowledges. Instead, as suggested by Brunner, Hofbauer, and Prabitz (2000), considering what to do about lay constructions and diffusion of academic theories presents the opportunity to productively question the basis for the legitimacy of academic and lay discourses of knowledge and bridge the socially constructed gap between them.

7.1 Limitations of Research

Inter-coder reliability would have improved the reliability of the qualitative analysis, but documenting the thematic coding of clusters under Appendix 7, and triangulation between repertory grids and interview responses, lends to their validity.

As discussed earlier, due to logistical constraints, laypeople sampled were limited in number and did not strictly represent Canadian population demographics. As such, findings (from all but the ANOVA) are not strictly generalizable, but should be regarded as preliminary findings, from which further research can begin.

7.2 Further Research

Further research could specify the meaning of attributes of academic theory popularity to a larger sample of laypeople. The predictive power of different attributes and constructs for diffusion could also be calculated. If future studies compared Google Trends data with other measures of idea diffusion, the validity of the measure could be better confirmed.

A wide spectrum of concepts and theories within DoI literature, such as communication channels, rates of adoption, adopter characteristics, and social context, could be applied to academic theories and other types of academic knowledge. In particular, investigating other stages of diffusion, like adoption, could raise interesting discussions of how theories are adopted and if attributes important to adoption are different from

those important to awareness or persuasion. Given that this dissertation has demonstrated the fertility of this original interdisciplinary area of study, there is substantial room for further research to develop.

References

Alexander, P. (1958). Theory-construction and theory-testing. *The British Journal for the Philosophy of Science*, *9*(33), 29–38. Retrieved from http://www.jstor.org/stable/686098

Allum, N., Sturgis, P., Tabourazi, D., & Brunton-Smith, I. (2008). Science knowledge and attitudes across cultures: A meta-analysis. *Public Understanding of Science*, *17*(1), 35–54. doi:11.1077/0963662506070159

Andrews, T. (2012). What is Social Constructionism? *The Grounded Theory Review*, *11*(1), 39–47. Retrieved from http://groundedtheoryreview.com/2012/06/01/what-is-social-constructionism/

Bak, H.-J. (2001). Education and public attitudes toward science: Implications for the "Deficit Model" of education and support for science and technology. *Social Science Quarterly*, *82*(4), 779–795. doi:10.1111/0038-4941.00059

Bakkalbasi, N., Bauer, K., Glover, J., & Wang, L. (2006). Three options for citation tracking: Google Scholar, Scopus and Web of Science. *Biomedical Digital Libraries*, *3*(7). doi:10.1186/1742-5581-3-7

Bauer, M. W. (2009). The evolution of Public Understanding of Science - Discourse and comparative evidence. *Science, Technology & Society*, *14*(2), 221–240. doi:10.1177/097172180901400202

Beauchesne, R. (2014). Google vs Bing? Which one are your customers using? Retrieved May 17, 2014, from http://www.aborg.com/2014/08/google-vs-bing-which-one-are-your-customers-using/

Becher, T., & Trowler, P. R. (2001). *Academic tribes and territories: Intellectual enquiry and the culture of disciplines* (2nd ed.). Buckingham, UK: Society for Research in Higher Education (SRHE) and Open University Press.

Belfiore, E. (2013). The "Rhetoric of Gloom" v. the discourse of impact in the humanities: Stuck in a deadlock? In E. Belfiore & A. Upchurch (Eds.), *Humanities in the twenty-first century: Beyond utility and markets*. Basingstoke, UK: Palgrave Macmillan.

Belfiore, E. (2014). "Impact", "value" and "bad economics": Making sense of the problem of value in the arts and humanities. *Arts & Humanities in Higher Education*, *14*(1), 95–110. doi:10.1177/1474022214531503

Bell, D. (1976). The coming of the post-industrial society. *The Educational Forum*, *40*(4), 574–579. doi:10.1080/00131727609336501

Benneworth, P. (2014). Tracing how arts and humanities research translates, circulates and consolidates in society. How have scholars been reacting to diverse impact and public value agendas? *Arts & Humanities in Higher Education*, *14*(1), 45–60. doi:10.1177/1474022214533888

Benzies, K. M., & Allen, M. N. (2001). Symbolic interactionism as a theoretical perspective for multiple method research. *Journal of Advanced Nursing*, *33*(4), 541–547. doi:10.1046/j.1365-2648.2001.01680.x

Berridge, V. (2003). Public or policy understanding of history? *Social History of Medicine*, *16*(3), 511–523. doi:10.1093/shm/16.3.511

Bezzi, A. (1999). What Is this thing called Geoscience? Epistemological dimensions elicited with the Repertory Grid and their implications for scientific literacy. *Science Education*, *83*(6), 675–700. doi:10.1002/(SICI)1098-237X(199911)83:6<675::AID-SCE3>3.0.CO;2-Q

Blalock, H. M. (1969). *Theory construction: From verbal to mathematical formulations*. Englewood Cliffs, NJ: Prentice Hall.

Boer, N.-I., Berends, H., & van Baalen, P. (2011). Relational models for knowledge sharing behavior. *European Management Journal*, *29*(2), 85–97. doi:10.1016/j.emj.2010.10.009

Bromme, R., Scharrer, L., Stadtler, M., Hömberg, J., & Torspecken, R. (2015). Is it believable when it's scientific? How scientific discourse style influences laypeople's resolution of conflicts. *Journal of Research in Science Teaching*, *52*(1), 36–57. doi:10.1002/tea.21172

Brunner, K.-M., Hofbauer, J., & Prabitz, G. (2000). Intellectual discourse in the academy and society: Interpretation, legitimation, and the rise of management talk. In R. H. Brown & J. D. Schubert (Eds.), *Knowledge and power in higher education: A reader* (pp. 70–87). New York, NY: Teachers College Press.

Burns, R., & Burns, R. (2008). Cluster Analysis. In *Business Research Methods and Statistics using SPSS* (pp. 552–567). London: SAGE Publications. Retrieved from http://studysites.uk.sagepub.com/burns/website material/Chapter 23 - Cluster Analysis.pdf

Calhoun, C. (2006). The university and the public good. *Thesis Eleven*, *84*(1), 7–43. doi:10.1177/0725513606060516

Cho, S., Sohn, C. H., Jo, M. W., Shin, S.-Y., Lee, J. H., Ryoo, S. M., … Seo, D.-W. (2013). Correlation between national influenza surveillance data and Google Trends in South Korea. *PLoS One*, *8*(12), e81422. doi:10.1371/journal.pone.0081422

Creswell, J., Klassen, A., Clark, V., & Smith, K. (2011). *Best practices for Mixed Methods research in the health sciences*. *Best practices for Mixed Methods research in the health sciences*. National Institutes of Health. Retrieved from http://obssr.od.nih.gov/mixed_methods_research/

Dearing, J. W. (2008). Evolution of diffusion and dissemination theory. *Journal of Public Health Management and Practice*, *14*(2), 99–108. doi:10.1097/01.PHH.0000311886.98627.b7

Decima Research, & Les Consultants Cultur'Inc. (1992). *Canadian arts consumer profile 1990-1991: Findings*. Ottawa: Communications Canada.

Einsiedel, E. F. (1994). Mental maps of science: Knowledge and attitudes among Canadian adults. *International Journal of Public Opinion Research*, *6*(1), 35–44. doi:10.1093/ijpor/6.1.35

Enders, C. K. (2004). Missing data in educational research: A review of reporting practices and suggestions for improvement. *Review of Educational Research*, *74*(4), 525–556. Retrieved from http://www.jstor.org/stable/3515980

Enders, C. K. (2010). *Applied missing data analysis*. London: Guilford Press.

Eysenck, H. J. (1981). General features of the model. In H. J. Eysenck (Ed.), *A Model for Personality* (pp. 1–37). New York, N.Y.: Springer-Verlag.

Field, A. (2000). Cluster analysis. doi:10.1016/B978-012691360-6/50012-4

Field, A. P. (2009). *Discovering statistics using IBM SPSS statistics: (and sex and drugs and rock "n" roll)* (3rd ed.). London: SAGE Publications Ltd.

Fransella, F., Bell, R., & Bannister, D. (2004). *A manual for repertory grid technique* (2nd ed.). Chichester: John Wiley & Sons.

Furnham, A. F. (1988). *Lay theories: Everyday understanding of problems in the Social Sciences*. Oxford, UK: Pergamon Press.

Glass, G. V, Peckham, P. D., & Sanders, J. R. (1972). Cosequences of faliure to meet assumptions underlying the Fixed Effects Analysis of Variance and Convariance. *Review of Educational Research*, *42*(3), 237–288. Retrieved from http://www.jstor.org/stable/1169991

Graham, I. D., Logan, J., Harrison, M. B., Straus, S. E., Tetroe, J., Caswell, W., & Robinson, N. (2006). Lost in knowledge translation: Time for a map? *The Journal of Continuing Education in the Health Professions*, *26*(1), 13–24. doi:10.1002/chp.47

Gray, D. E. (2014). Theoretical perspectives and research methodologies. In *Doing research in the real world* (3rd ed., pp. 15–38). London: SAGE Publications.

Grek, S., & Ozga, J. (2010). Re-inventing public education: The new role of knowledge in education policy making. *Public Policy and Administration*, *25*(3), 271–288. doi:10.1177/0952076709356870

Harri-Augstein, E. S., & Thomas, L. F. (1978). The Kelly Repertory Grid as a vehicle for eliciting a personal taxonomy of purposes for reading. *Journal of Research in Reading*, *1*(1), 53–66. doi:10.1111/j.1467-9817.1978.tb00172.x

Harris, S. R. (2010). *What is Constructionism?: Navigating its use in Sociology*. London: Lynne Rienner Publishers.

Hassinger. (1959). Stages in the adoption process. *Rural Sociology*, *24*(1), 52–53. Retrieved from http://chla.library.cornell.edu/cgi/t/text/pageviewer-idx?c=chla;rgn=full text;idno=5075626_4310_001;view=image;seq=56;cc=chla;page=root;size=s;frm=frameset;

Heckmann, M. (2014). OpenRepGrid: An R package for the analysis of repertory grids. ZENODO. doi:10.5281/zenodo.8492

Hewstone, M. (1983). *Attribution theory: Social and functional extensions*. Oxford: Blackwell Publishing.

Hilgartner, S. (1990). The dominant view of popularization: Conceptual problems, political uses. *Social Studies of Science*, *20*(3), 519–539. Retrieved from http://www.jstor.org/stable/284996

Holland, S. M. (2006). Cluster analysis. Retrieved August 10, 2015, from http://strata.uga.edu/software/pdf/clusterTutorial.pdf

Horst, M. (2013). A field of expertise, the organization, or science Itself? Scientists' perception of representing research in public communication. *Science Communication*, *35*(6), 758–779. doi:10.1177/1075547013487513

Howell, D. C. (2008). The treatment of missing data. In W. Outhwaite & S. Turner (Eds.), *Handbook of Social Science methodology* (pp. 212–227). London: SAGE Publications. doi:http://dx.doi.org/10.4135/9781848607958.n11

Hussler, C., & Rondé, P. (2007). The impact of cognitive communities on the diffusion of academic knowledge: Evidence from the networks of inventors of a French university. *Research Policy*, *36*(2), 288–302. doi:10.1016/j.respol.2006.11.006

Janda, L. H., England, K., Lovejoy, D., & Drury, K. (1998). Attitudes toward psychology relative to other disciplines. *Professional Psychology: Research and Practice*, *29*(2), 140–143. doi:10.1037/0735-7028.29.2.140

Jun, S.-P., Yeom, J., & Son, J.-K. (2014). A study of the method using search traffic to analyze new technology adoption. *Technological Forecasting and Social Change*, *81*, 82–95. doi:10.1016/j.techfore.2013.02.007

Kang, M., Zhong, H., He, J., Rutherford, S., Yang, F., & Vespignani, A. (2013). Using Google Trends for influenza surveillance in South China. *PLoS ONE*, *8*(1), e55205. doi:10.1371/journal.pone.0055205

Kapoor, K. K., Dwivedi, Y. K., & Williams, M. D. (2014). Innovation adoption attributes: A review and synthesis of research findings. *European Journal of Innovation Management*, *17*(3), 327–348. doi:10.1108/EJIM-08-2012-0083

Kelly, G. (1955). *The psychology of personal constructs: A theory of personality*. New York: W. W. Norton & Company.

Kerner, J. F., & Hall, K. L. (2009). Research dissemination and diffusion: Translation within science and society. *Research on Social Work Practice*, *19*(5), 519–530. doi:10.1177/1049731509335585

Knight, D. M. (2011). *Public understanding of science: A history of communicating scientific ideas* (2nd ed.). London: Routledge.

Kousha, K., & Thelwall, M. (2007). Google Scholar citations and Google Web/URL citations: A multi-discipline exploratory analysis. *Journal of the American Society for Information Science and Technology*, *58*(7), 1055 – 1065. doi:10.1002/asi.20584

Krull, D. S., & Silvera, D. H. (2013). The stereotyping of science: Superficial details influence perceptions of what is scientific. *Journal of Applied Social Psychology*, *43*(8), 1660–1667. doi:10.1111/jasp.12118

Kwan, Y., & Chan, L. M. (2010). Revisiting the syntactical and structural analysis of Library of Congress Subject Headings for the digital environment. *Journal of American Society for Information Science and Technology*, *61*(4), 677–687. doi:10.1002/asi.21295

Larsen, G. D. (2011). Understanding the early stages of the innovation diffusion process: Awareness, influence and communication networks. *Construction Management and Economics*, *29*(10), 987–1002. doi:10.1080/01446193.2011.619994

Leisyte, L., & Horta, H. (2011). Introduction to a special issue: Academic knowledge production, diffusion and commercialization: Policies, practices and perspectives. *Science and Public Policy*, *38*(6), 422–424. doi:10.3152/030234211X12960315267697

Levi, A. W. (1983). The Humanities: Their essence, nature, future. *Journal of Aesthetic Education*, *17*(2), 5–17. Retrieved from http://www.jstor.org/stable/3332326

Lilienfeld, S. O. (2011). Public skepticism of psychology: Why many people perceive the study of human behavior as unscientific. *American Psychologist*, *67*(2), 111–129. doi:10.1037/a0023963

Lin, N., & Burt, R. S. (1975). Differential effects of information channels in the process of innovation diffusion. *Social Forces*, *54*(1), 256–274. Retrieved from http://www.jstor.org/stable/2576092

Locke, S. (1999). Golem science and the public understanding of science: From deficit to dilemma. *Public Understanding of Science*, *8*(2), 75–92. doi:10.1088/0963-6625/8/2/301

Locke, S. (2001). Sociology and the public understanding of science: From rationalization to rhetoric. *British Journal of Sociology*, *52*(1), 1–18. doi:10.1080/00071310020023000

Lomas, J. (1993). Diffusion, dissemination, and implementation: Who should do what? *Annals of the New York Academy of Sciences*, *703*, 226–237. doi:10.1111/j.1749-6632.1993.tb26351.x

Lujan, J. L., & Todt, O. (2007). Precaution in public: The social perception of the role of science and values in policy making. *Public Understanding of Science*, *16*(1), 97–109. doi:10.1177/0963662506062467

Mellon, J. (2014). Internet search data and issue salience: The properties of Google Trends as a measure of issue salience. *Journal of Elections, Public Opinion and Parties*, *24*(1), 45–72. doi:10.1080/17457289.2013.846346

Mesaros, C. (2011). Philosophy and tribes. That much enclosure! In C. Mesaros (Ed.), *Knowledge communication: Transparency, democracy, global governance* (pp. 93–104). Editura Universității de Vest. Retrieved from https://books.google.co.uk/books?id=2zNRAgAAQBAJ&pg=PA11&lpg=PA11&dq=K

nowledge+Communication:+Transparency,+Democracy,+Global+Governance&source=bl&ots=pSzGXUWiEb&sig=j3Ss53QLuL26qm2WCa8lHTnkdm8&hl=en&sa=X&ei=kixsVcy-HM-Q7AbkgYPQCQ&ved=0CC0Q6AEwAQ#v=onepage&q=Knowledge Communication%3A Transparency%2C Democracy%2C Global Governance&f=false

Mikulak, A. (2011). Mismatches between "scientific" and "non-scientific" ways of knowing and their contributions to public understanding of science. *Integrative Psychological and Behavioral Science*, *45*(2), 201–15. doi:10.1007/s12124-011-9157-8

Miles, M. B., Huberman, A. M., & Saldana, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). London: SAGE Publications.

Miller, L. N. (2011). Physicists and astronomers use Google as a starting point for specific queries, but do not intentionally use it to search for articles. *Evidence Based Library and Information Practice*, *6*(1), 81–84. Retrieved from http://ejournals.library.ualberta.ca/index.php/EBLIP/article/view/9426

Moore, G. C., & Benbasat, I. (1991). Development of an Instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research*, *2*(3), 192–222. doi:10.1287/isre.2.3.192

Nasshei, A. (1989). Action and structure. On a theory of science for the Humanities (Book Review). *Philosophy and History*, *22*(2), 163–164. doi:10.5840/philhist198922286

Nowotny, H., Scott, P., & Gibbons, M. (2001). *Re-thinking science: Knowledge and the public in an age of uncertainty*. Cambridge: Polity Press.

Oancea, A. (2011). *Interpretations and practices of research impact across the range of disciplines*. Oxford, UK.

Park, H., & Woodruff, E. (2014). Changes of students' understanding of the nature of science after two and half years of public science education in Ontario Canada. *Journal of Science Education*, *38*(1), 57–77. Retrieved from http://www.academia.edu/8558871/Changes_of_Students_Understanding_of_NOS_After_Two_and_Half_Years_of_Public_Science_Education_in_Ontario

Pasta, D. J., & Francisco, S. (2009). Learning when to be discrete: Continuous vs. categorical predictors. In *SAS Global Forum 2009 Conference*. Cary, NC: SAS Institute Inc. Retrieved from http://support.sas.com/resources/papers/proceedings09/248-2009.pdf

Penfield, T., Baker, M. J., Scoble, R., & Wykes, M. C. (2014). Assessment, evaluations, and definitions of research impact: A review. *Research Evaluation*, *23*(1), 21–32. doi:10.1093/reseval/rvt021

Pettit, B. (2000). Resources for studying public participation in and attitudes towards the arts. *Poetics*, *27*(5-6), 351–395. doi:10.1016/S0304-422X(00)00008-5

Pike, S. (2004). The use of repertory grid analysis and importance-performance analysis to identify determinant attributes of universities. *Journal of Marketing for Higher Education*, *14*(2), 1–18. Retrieved from http://eprints.qut.edu.au/6356/1/6356.pdf

Retzbach, A., Marschall, J., Rahnke, M., Otto, L., & Maier, M. (2011). Public understanding of science and the perception of nanotechnology: The roles of interest in science, methodological knowledge, epistemological beliefs, and beliefs about science. *Journal of Nanoparticle Research*, *13*(12), 6231–6244. doi:10.1007/s11051-011-0582-x

Rogers, E. (1962). *Diffusion of Innovations* (1st ed.). New York: Free Press of Glencoe.

Rogers, E. (1983). *Diffusion of Innovations* (3rd ed.). New York: Free Press.

Rogers, E. (2003). *Diffusion of Innovations* (5th ed.). New York: Free Press.

Rosell, C., & Agrawal, A. (2006). *University patenting: Estimating the diminishing breadth of knowledge diffusion and consumption* (No. 12640). Cambridge, MA. Retrieved from http://www.nber.org/papers/w12640

Roth, W.-M., & Lucas, K. B. (1997). From "truth" to "invented reality": A discourse analysis of high school physics students' talk about scientific knowledge. *Journal of Research in Science Teaching*, *34*(2), 145–179. doi:10.1002/(SICI)1098-2736(199702)34:2<145::AID-TEA4>3.0.CO;2-T

Scharrer, L., Bromme, R., Britt, M. A., & Stadtler, M. (2012). The seduction of easiness: How science depictions influence laypeople's reliance on their own evaluation of scientific information. *Learning and Instruction*, *22*(3), 231–243. doi:10.1016/j.learninstruc.2011.11.004

Schwandt, T. A. (2000). Three epistemological stances for qualitative inquiry: Interpretivism, Hermeneutics, and Social Constructionism. In N. Denzin & Y. Lincoln (Eds.), *Handbook of Qualitative Research* (2nd ed., pp. 189–213). London: SAGE Publications. Retrieved from http://www.uky.edu/~addesa01/documents/Schwandt.pdf

Selltiz, C., Jahoda, M., Deutsch, M., Cook, S. W., Chein, I., & Proshansky, H. M. (1959). *Research methods in social relations* (Revised vo.). New York, NY: Holt-Dryden.

Setala, V., & Valiverronen, E. (2011). Public perception of evolution and the rise of evolutionary psychology in Finland. *Public Understanding of Science*, *20*(4), 558–573. doi:10.1177/0963662509358502

Sinatra, G. M., Kienhues, D., & Hofer, B. K. (2014). Addressing challenges to Public Understanding of Science: Epistemic cognition, motivated reasoning, and conceptual change. *Educational Psychologist*, *49*(2), 123–138. doi:10.1080/00461520.2014.916216

Sjöström, A., Sowka, A., Gollwitzer, M., Klimmt, C., & Rothmund, T. (2013). Exploring audience judgments of Social Science in media discourse: The case of the violent video games debate. *Journal of Media Psychology*, *25*(1), 27–38. doi:10.1027/1864-1105/a000077

Slaughter, S., & Rhoades, G. (2004). *Academic Capitalism and the New Economy: Markets, state, and higher education*. Baltimore: The John Hopkins University Press.

Stehr, N. (1994). *Knowledge societies*. London: SAGE Publications Ltd.

Sturgis, P., & Allum, N. (2004). Science in society: Re-evaluating the deficit model of public attitudes. *Public Understanding of Science*, *13*(1), 55–74. doi:10.1177/0963662504042690

Szelényi, K., & Bresonis, K. (2014). The public good and academic capitalism: Science and engineering doctoral students and faculty on the boundary of knowledge regimes. *The Journal of Higher Education*, *85*(1), 126–153. doi:10.1353/jhe.2014.0004

Tan, F. B., & Hunter, M. G. (2002). The repertory grid technique: A method for the study of cognition in information systems. *MIS Quarterly*, *26*(1), 39–57. Retrieved from http://www.jstor.org/stable/4132340

Teddlie, C., & Tashakkori, A. (2009). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral science*. London: SAGE Publications.

Teo, T. (2012). Psychology is still a problematic science and the public knows it. *American Psychologist*, *67*(9), 807–808. doi:10.1037/a0030084

Tornatzky, L. G., & Klein, K. J. (1982). Innovation characteristics and innovation adoption-implementation: A meta-analysis of findings. *IEEE Transactions on Engineering Management*, *EM-29*(1), 28–45. doi:10.1109/TEM.1982.6447463

Valdivia, A., & Monge-Corella, S. (2010). Diseases tracked by using Google Trends, Spain. *Emerging Infectious Diseases*, *16*(1), 168. doi:10.3201/eid1601.091308

Valentine, E. R. (1992). *Conceptual issues in psychology* (2nd ed.). London: Routledge.

Vosen, S., & Schmidt, T. (2011). Forecasting private consumption: Survey-based indicators vs. Google Trends. *Journal of Forecasting*, *30*(6), 565–578. doi:10.1002/for.1213

Walsh, J. (1982). Public attitude toward science is Yes, but--. *Science*, *215*(4530), 270–272. Retrieved from http://www.jstor.org/stable/1688234

Weenig, M. W. H., & Midden, C. J. H. (1991). Communication network influences on information diffusion and persuasion. *Journal of Personality and Social Psychology*, *61*(5), 734–742. doi:10.1037/0022-3514.61.5.734

Wejnert, B. (2002). Integrating models of Diffusion of Innovations: A conceptual framework. *Annual Review of Sociology*, *28*, 297–326. doi:10.1146/annurev.soc.28.110601.141051

Wigren-Kristoferson, C., Gabrielsson, J., & Kitagawa, F. (2011). Mind the gap and bridge the gap: Research excellence and diffusion of academic knowledge in Sweden. *Science and Public Policy*, *38*(6), 481–492. doi:10.3152/030234211X12960315267859

Williams, J. (2014). A critical exploration of changing definitions of public good in relation to higher education. *Studies in Higher Education*, 1–12. doi:10.1080/03075079.2014.942270

Winer, L. R., & Vázquez-Abadi, J. (1995). The potential of repertory grid technique in the assessment of conceptual change in physics. In *Annual Meeting of the American Educational Research Association*. San Francisco: American Educational Research Association. Retrieved from http://eric.ed.gov/?id=ED390935

Wynne, B. (1992). Misunderstood misunderstanding: Social identities and public uptake of science. *Public Understanding of Science*, *1*(3), 281–304. doi:10.1088/0963-6625/1/3/004

Wynne, B. (1995). Public understanding of science. In S. Jasanoff, G. Markle, J. Peterson, & T. Pinch (Eds.), *Handbook of science and technology studies* (pp. 361–389). Thousand Oaks: SAGE Publications. doi:10.4135/9781412990127.d24

Zima, P. V. (2007). *What is theory? Cultural theory as discourse and dialogue*. New York: Continuum International Publishing Group.

Zuber-Skerritt, O. (1987). A repertory grid study of staff and students' personal constructs of educational research. *Higher Education*, *16*(5), 603–623. Retrieved from http://www.jstor.org/stable/3446835

Appendix 1: CUREC Ethical Approval

Dear Kira,

Dusty Books or Words on the Street: Canadians' Interest in Academic Theories

The above application has been considered on behalf of the Departmental Research Ethics Committee (DREC) in accordance with the procedures laid down by the University for ethical approval of all research involving human participants.

I am pleased to inform you that, on the basis of the information provided to DREC, the proposed research has been judged as meeting appropriate ethical standards, and accordingly, approval has been granted.

If your research involves participants whose ability to give free and informed consent is in question (this includes those under 18 and vulnerable adults), then it is advisable to read the following NSPCC professional reporting requirements for cases of suspected abuse

http://www.nspcc.org.uk/globalassets/documents/information-service/factsheet-child-abuse-reporting-requirements-professionals.pdf

Should there be any subsequent changes to the project which raise ethical issues not covered in the original application you should submit details
to research.office@education.ox.ac.uk for consideration.

Good luck with your research study.

Yours sincerely,

Nigel

_____

Dr. Nigel Fancourt
Departmental Lecturer
Department of Education

Appendix 2: Categorization of Theories into Domains

Domain	Physical Sciences	Social Sciences	Humanities
Disciplines	Biology	Anthropology	History
	Chemistry	Cultural studies	Linguistics
	Physics	Economics	Literature
	Geology	Gender studies	Philosophy
	Environmental sciences	Geography	Religious Studies
	Astronomy	Political science	Music
	Zoology	Psychology	Film
		Sociology	Visual arts
Theories	General Relativity theory	Gestalt psychology	Teleology
	Electromagnetic theory	Physiognomy	Rationalism
	Mesmerism	Telepathy	Anthroposophy
	Lunar theory	Theism	Music Theory
	Fermi liquid theory	Welfare state	Government and binding
	Vortex theory	Differential association	Emotivism
	Wave theory of light	Critical theory	Stratificational grammar
	Big bang theory	Efficient market hypothesis	Substratum theory
	Thomas-Fermi Model	Quantity Theory of Money	Speech act
	Kinetic theory of gases	Diathesis-stress model	Contractarianism (social contract)
	Neptunian theory	Perceptual control theory	Divine command theory
	String theory	Regime theory	Meaning-text theory
	Magneto-ionic theory	Price theory	Auteur theory
	Baeyer strain theory	Activity theory	Autosegmental Phonology
	Density wave theory	Object relations theory	Optimality theory
	Energy band theory	Spontaneous generation	Agnosticism
	Linear transport theory	Balance theory	Baconian theory
	Special relativity	Behaviourism	Feminist literary criticism
	Yang Mills theory	Benefit theory of Taxation	Hermeneutics
	Free electron model	Capital theory	Coherence theory of truth
	Dynamo theory	Cognitive development theory	Deflationary theory

	Atomic theory	Theory of Second Best	Genre theory
	Key block theory	Hopelessness theory of depression	Fiction theory
	Molecular theory	Turnpike theory	Sun Language theory
	Crystal field theory	Efficiency wage theory	Historicism
	Mie scattering	Permanent income	Hylozoism
	Bootstrapping model	Labour theory of value	Idealism
	Coupled mode theory	Reversal theory	Internalism
	Theory of excitons	Utility theory	Frontier thesis
	Evolutionary theory	Actor network theory	Foundationalism

Appendix 3: Interview Protocol

1) Initial Approach (Skype Chat)
Hello [name],

My name is Kira Brayman, I'm a Canadian studying in Oxford. Sorry if I'm disturbing you, but I think you could be of help in my research on how Canadians perceive academic ideas. I am trying to talk with Canadians who have [high school education (or not completed) [, or] college or trades education [, or] a university Bachelor's degree]. If you [fall into this category and] have time, I'd like to chat with you so that I can understand some of your opinions on the matter. This would greatly contribute towards our understanding of the benefits and challenges of spreading awareness of ideas beyond academia. Would you be interested in participating in this interview?

Thank you!

No → Would it be better to arrange another time?
    No → Alright, thank you for your time.
    Yes → Excellent, when would be good for you?

Yes → Excellent. First I'd like to provide you with an information sheet to introduce you to the research project, obtain your formal consent, and then dive straight into the questions. The whole thing should take about 60 minutes. Does that sound okay?

No → Is there something I can clarify?
Yes → Great. So, I will attach a file to this chat message that you should see in your window. There aren't any viruses – it is just a PDF file, and so can't contain the kind of program that a virus would need to run. Just click to start downloading it and then give it a read.

Let me know if you are unable to receive the file. It happens sometimes depending on the version of Skype you have and the device you are using it on. If you can't see it I can provide you with links directly to the document.

Attach Information Sheet For the Public

https://drive.google.com/file/d/0B-IT62e-jSGgY2F4Vzl6YUtEWVE/view?usp=sharing

When you are done, or if you have any questions along the way, please let me know.

2) Oral Consent (Chat)

Do you give your permission for me to interview you?

Do you give me permission to keep a record of this conversation?

Do you give your permission for me to use your first name (or an alias if you prefer) and profession in the reporting of this interview?

Do you give your permission for me to re-contact you to clarify information?

And for my records, what is your first and last name?

Once consent is obtained, make a new Record of Oral Consent Form.*

Great. Now that the paperwork is done, are you feeling ready to begin the interview?

Reschedule → Alright, when would be a good time? *Be sure to remind participant of the key points of the information sheet and reconfirm consent given.*

Okay great. I will call you over Skype, start the audio recording, and then we'll begin. If at any point the call gets too bad, then you can always send me another chat message, by clicking on the little chat bubble in the bottom right of the screen or depending on your version of Skype it may be a + sign in the bottom, from which you can select Instant Message. From there we can continue on chat until the call quality improves.

Start recording. Call on Skype

3) Background Information

So [name], we will start with a couple of basic questions.

1. What kind of work do you do?

2. What level of education have you completed?

    a. If above high school → What did you study?
    b. If high school or less → Were there any subjects that you enjoyed?

3. Why did you like that subject more than others?

4) Perceptions of Academic Theories – Repertory Grid

Now I have some questions that deal a bit more with the ideas that come out of and are talked about in universities. As I explain a few things, please feel free to stop me at any time and ask any questions, or to repeat anything I said.

So, in terms of ideas from universities, I'm specifically researching about theories: ideas that explain, predict, or understand some aspect of the universe. You can keep this definition in mind or refer back to the information sheet I sent you if it helps, but mostly importantly remember that this isn't a quiz, and there are no right or wrong answers. I am interested in understanding your thoughts and opinions.

To make this easier, I will walk you through what's called a 'repertory grid'. First, I'll explain what we'll be doing with an example of a completed repertory grid on tourist destinations. ****Send example****

https://drive.google.com/file/d/0B-IT62e-jSGgVlNucUVUNmNSQzQ/view?usp=sharing

The first part of the grid is the six elements at the top. In this case they are six tourist destinations, and in the grid you will be completing they will be six academic theories that you select.

By looking at one of these elements at a time, you come up with the ideas listed under the similarity pole. Then by describing a contrasting element, you come up with the idea under the contrast pole. The similarity and contrast poles form two opposite ends of the same idea. For example, if I was asked to describe Miami as a possible travel destination, I might say that it is dominated by Americans. Then I would look for an element that is the opposite of this - perhaps Hawaii, since it is has more locals. It doesn't matter if this is true, just that it is my perception of Miami and Hawaii. It is completely up to you what ideas you come up with.

Another example might be if I thought of Paris, I might say that it is very cultural and historical. Then perhaps I would say Hawaii is different from Paris in this way because it is more natural. Can you see how I am beginning to fill out these poles or ideas based on the comparisons I make between elements? Did you want to go through a couple more examples of this?

The middle part of the grid involves rating each of the elements out of 5, according to the poles that you came up with. 1 would represent being close to the similarity pole, 5 would represent being close to the contrast pole, and 2, 3, and 4 would be in between. So for the pole of American dominated versus more locals, I rated Miami a 1 because I thought it was dominated by Americans, but I rated Beijing a 5 because I thought there were mostly locals there. I rated Barcelona, Paris and Bangkok a 3, because I thought that while there were lots of locals there, there were probably also a reasonable amount of American tourists. Would you like me to go through another example of the rating system?

Similarity Pole	Miami	Paris	Barcelona	Bangkok	Beijing	Hawaii	Contrast Pole
1 ←							→ 5
American dominated	1	3	3	3	5	4	More locals
Lots of history	5	1	3	2	1	4	Natural
Beaches	1	4	2	3	5	1	Industrial
Great food	4	1	2	1	4	3	Food I don't like
Cultural	5	1	3	3	1	3	Tourist trap
Parties	1	3	1	1	4	3	Quiet
Close flights	1	3	3	5	5	2	Far away
Visible poverty	3	1	2	4	4	3	First world

Do you have any questions so far about the repertory grid?

Okay so to get started on doing your own grid, I am going to ask you to pick six theories: two from the physical sciences category, two from the social sciences category and finally two from the humanities category. I will send you a list you can choose from, but keep in mind that it is perfectly normal if you don't recognize some or most of the theories. These are some complex and often specific ideas, which are not always very intuitive. This is not something to be worried about; we will work through it as we go. Okay?

*With that being said, here is a list that you can choose from ***send list****.

https://drive.google.com/file/d/0B-IT62e-jSGgbDBxMmJTd3Z2dzg/view?usp=sharing

If you like, I can give you some definitions to refer to, but if you can try to pick something that you recognize. They may have been theories that you studied in school, heard about from family or friends, or documentaries or news reports. Again, just remember this isn't a test.

Physical Sciences	**Social Sciences**	**Humanities**
General Relativity theory	Gestalt psychology	Teleology
Electromagnetic theory	Physiognomy	Rationalism
Lunar theory	Telepathy	Anthroposophy
Vortex theory	Theism	Music Theory
Big bang theory	Welfare state	Speech act
String theory	Differential association	Social contract theory
Energy band theory	Critical theory	Divine command theory
Special relativity	Price theory	Agnosticism

Atomic theory	Activity theory	Hermeneutics
Molecular theory	Spontaneous generation	Genre theory
Evolutionary theory	Behaviourism	Historicism
	Cognitive development	Idealism

4. So what were the theories you picked from physical sciences?

5. Okay great. And what about social sciences?

6. Excellent. And then from the humanities?

Wonderful. Now we have six theories to work with. I have sent you a chat message listing the six theories so that you can refer to them as we go. Let me know if you would like me to remind you of any of their definitions. And again, please stop me where something is unclear or if you would like me to repeat any of the earlier instructions.

So, the next step involves describing reasons for the popularity, or lack of it, of the theories you just chose. I will randomly select a theory to start with, and then ask you to describe a reason for its popularity in a few words or a short phrase. Then, I will ask you to pick a second theory from the list that you think is different in this way, and to tell me in your own words why you think it is different.

This might sound difficult, but we'll try a couple and I bet you will surprise yourself. Remember, this isn't a test about your knowledge of the theories, I am just trying to understand how you perceive different theories, and there is no right or wrong answer. Do you have any questions about this before we start?

Okay great. So let's try one first that you seem a bit more familiar with:

7. [Theory X]. How would you describe a reason for its popularity, or lack thereof?
    a. Which of the other five theories is different from [X] in this way? Could you tell me in your own words why you picked that one as different?

Repeat for all six theories, or until no new constructs are elicited.

Similarity Pole 1 ←	Theory A1	Theory A2	Theory B3	Theory B4	Theory C5	Theory C6	Contrast Pole → 5

Advantageous							Disadvantageous
Compatible with my beliefs							Incompatible with my beliefs
Complex							Simple
Observable							Hidden

*So here is the current version of your grid ***send image**.*

There is one more part to completing it. Using the ideas that you've come up with in your comparisons, I am going to ask you to rate all of the theories. It will be on a scale of 1 to 5, with 1 representing closeness to the similarity pole, 5 representing closeness to the opposite contrast pole, and 2, 3 and 4 falling in between. It would be great if you could explain a little bit about your thinking as you do so. Do you have any questions about this?

8. Okay, so the first construct you came up with was [Construct 1]. With 1 being closer to [Construct1a] and 5 being closer to [Construct 1b] how would you rate [Theory 1] on the scale of 1 to 5?

9. What about [Theory 2]?

… Repeat for all theories on all constructs.

10. The last few ideas are ones that I've added. How would you rate [Theory 1] on a scale between advantageous (being 1) and disadvantageous (being 5)?

… Repeat until [Theory 6] for remaining constructs.

*Great, thank you. You did really well - I know that isn't always an easy task. Here is what your grid looks like ***send image**.*

11. Do you think this grid – the constructs and the ratings – accurately represent your thoughts about the popularity of academic theories?

5) Conclusion

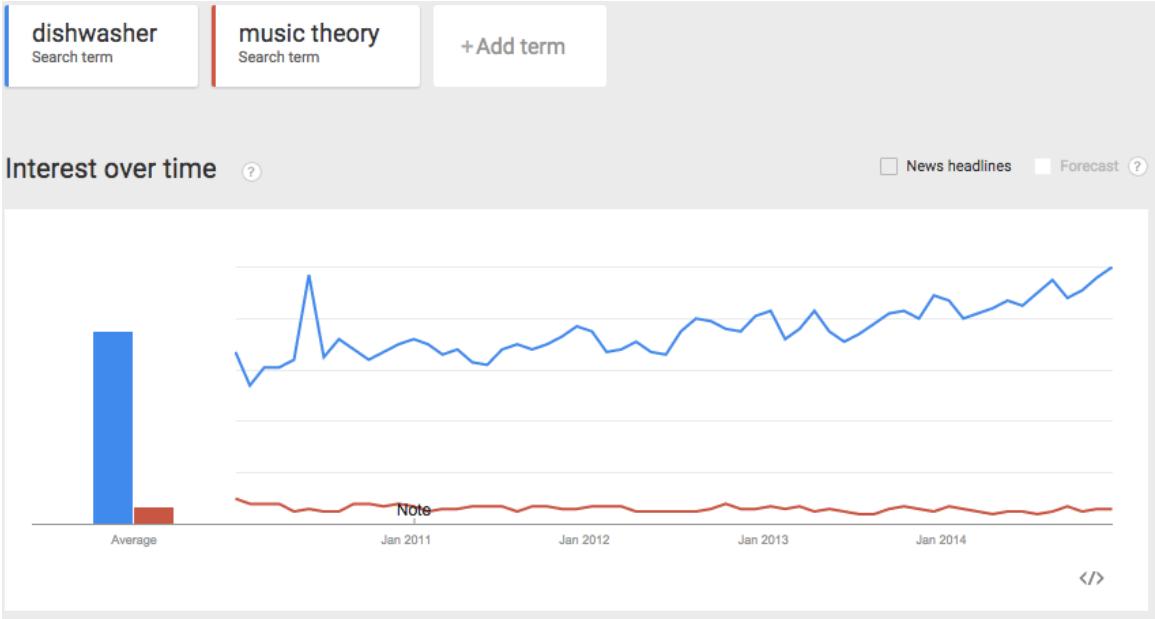
I'll just ask you a few more questions that we didn't get to cover in the grid process, which should take about another 5 minutes.

12. The theories you picked are relatively widely known compared to other theories. Why do you think the theories you picked were more widely known?

13. Why do you think other academic theories aren't known well – what is it about them that makes them unknown?

Here's a graph of how often Canadians looked up 'dishwasher', in blue, compared to 'music theory', in red, in the last several years.

https://drive.google.com/file/d/0B-IT62e-jSGgTlB4LVl4SU9jTVE/view?usp=sharing



14. Why do you think Canadians are searching less for 'music theory' than 'dishwasher'?

15. Do you think theories from the humanities, social sciences or physical sciences would be more popular? Why or why not?

16. How much do you care about being aware of academic theories, if at all?

17. What role do you think academic theories should play in society?

18. Lastly, was there anything that I missed or that you would like to add?

Thank you very much for your time. What we've talked about will really add to the discussion of these issues in my thesis. If you like, I would be happy to provide you with a copy of it once it is finished.

Yes → Great. Is there an email address that I can send it to?
No → That's fine.

Thank you again for your help today - it is very much appreciated. If you have any questions or comments in the upcoming days you can always reach me at kira.brayman@lmh.ox.ac.uk. Have a great day!

Appendix 4: Repertory Grids

Aaron

Similarity Pole	Big bang theory	Evolutionary theory	Welfare state	Behaviourism	Agnosticism	Historicism	Contrast Pole
1 ←							→ 5
Lash-back against religion	1	1	5	1	3	3	Moral responsibility
Science generates more questions	5	5	3	2	1	3	Science as a way to explain everything
Reassuring idea	3	2	1	3	5	4	Not reassuring
In people's interest	3	2	1	3	3	1	Not future-oriented
Explains who we are	3	1	4	1	5	1	Doesn't explain who we are
Natural state of ambiguity	5	5	3	5	1	3	Not a lot of ambiguity
Detailed records	5	4	3	2	5	1	No record of what happened
Advantageous	2	1	1	1	3	3	Disadvantageous
Compatible with my beliefs	2	1	2	3	1	2	Incompatible with my beliefs
Simple	5	3	5	2	5	5	Complex
Observable	5	4	1	1	3	2	Hidden
Scarcely known	3	5	4	4	5	3	Widely known

Alabi

Similarity Pole	Energy band theory	Electromagnetic	Telepathy	Behaviourism	Divine command theory	Teleology	Contrast Pole
1 ←							→ 5
Kept away in academia	1	4	5	3	5	3	Media channels
Proven	1	1	5	2	5	4	No scientific evidence
Minimal arguments	1	3	4	3	5	3	A lot of debate
Direct application to the end user	5	1	3	3	1	4	End user would not (need) understand
Promoted by fiction	2	1	1	4	1	3	Not promoted by fiction
People relate to it	3	1	1	2	4	3	Want to move away from it
Prediction of human behaviour	5	5	1	1	1	5	Understanding according to purpose
Influence across cultures	5	1	2	5	1	3	Influence within a culture
Religious belief	3	3	2	5	1	1	Prediction according to culture
Want to know where we come from	4	4	3	3	1	1	Does not believe God created world
Understanding of purpose	1	1	3	5	1	1	Influence, culture, behaviour
Advantageous	1	1	4	3	1	1	Disadvantageous
Compatible with my beliefs	2	1	5	2	1	1	Incompatible with my beliefs
Simple	5	1	1	2	1	5	Complex
Observable	5	2	4	1	1	5	Hidden
Scarcely known	2	4	5	4	2	4	Widely known

Arianna

Similarity Pole	Evolutionary theory	Special relativity	Telepathy	Cognitive development	Rationalism	Agnosticism	Contrast Pole
1 ←							→ 5
Learn about school	1	3	5	2	3	5	Least rooted in scientific fact
Debates	3	5	5	4	4	5	Less debated because of religious connotations
Known public figure	2	1	5	2	2	3	Believers cast aside
Media	3	4	1	2	5	2	Not in the media
Fun – not associated with academia	3	5	1	4	4	2	Not entertaining – more homework than fun
Interesting	3	5	1	3	4	2	Boring, not interesting
Foundation for scientific thought	1	1	5	2	4	3	Not scientifically proven
Secular society	5	5	3	4	2	4	Gain knowledge through science
Not sure what to believe	4	4	2	3	2	1	Evidence as basis for belief
Comfortable, safer	2	3	5	2	4	1	Don't believe enough in it to feel secure
Advantageous	2	2	4	1	3	3	Disadvantageous
Compatible with my beliefs	1	1	4	2	4	2	Incompatible with my beliefs
Simple	2	5	4	2	3	2	Complex
Observable	1	5	5	2	4	2	Hidden
Scarcely known	5	4	5	3	4	5	Widely known

Étienne

Similarity Pole	String theory	Evolutionary theory	Telepathy	Behaviourism	Divine command	Historicism	Contrast Pole
1 ←							→ 5
Specific	1	3	5	2	5	4	Less specific to domain
Hard to explain	1	4	5	3	5	4	Not as complex
Doesn't change anything for laypeople	1	3	5	2	5	4	Changes something for laypeople
Hear about it from people we know	4	1	1	5	1	4	Don't explicitly talk about it
Advertisements	4	1	2	5	1	5	Not a lot of advertisements
Role-playing games, science fiction	2	2	1	4	1	2	Not in RPG or SciFi
Non-fiction book	1	1	5	1	5	1	Fictional media
Religious books	5	5	5	5	1	5	Not in religious texts
Helpful to understanding	3	1	5	5	2	1	Doesn't explain much of what happened
Understand concept without name	1	4	3	2	5	2	Name gives the theory
Advantageous	2	1	1	2	1	1	Disadvantageous
Compatible with my beliefs	1	1	5	1	5	1	Incompatible with my beliefs
Simple	5	3	2	4	1	2	Complex
Observable	5	2	1	4	3	1	Hidden
Scarcely known	5	5	5	4	2	3	Widely known

Evelina

Similarity Pole	Big bang theory	Evolutionary theory	Telepathy	Cognitive development	Idealism	Music theory	Contrast Pole
1 ←							→ 5
Question existence; beginning of everything	1	1	3	1	4	1	End of everything; no reality
TV show; secondary popularized versions	4	4	2	5	3	4	Looking to original source of idea
Curiosity of past	1	1	3	1	4	3	No wonderment about what came before
Like idea of world where its true	3	3	1	3	3	3	Interest, speculation
Compare their perceptions of the world	2	2	3	2	4	1	Only one idea of something across people
Ideas in movie	4	4	3	4	4	3	Forming the idea; spontaneous wondering
Existence based on something else	5	4	3	4	5	1	Just ideas
Advantageous	1	1	3	3	3	2	Disadvantageous
Compatible with my beliefs	3	1	1	1	5	1	Incompatible with my beliefs
Simple	3	1	5	1	3	1	Complex
Observable	5	1	3	2	4	1	Hidden
Scarcely known	3	5	5	3	4	5	Widely known

Jacob

Similarity Pole	Big bang	Special relativity	Welfare state	Cognitive development	Idealism	Rationalism	Contrast Pole
1 ←							→ 5
Scientific backing, facts	1	1	2	2	5	3	Less rooted in concrete proofs
Physically proven, manifested	1	1	2	3	5	2	Everything not concrete
Positive, like the benefits	5	3	2	3	1	5	Cold, less about people, raw data
Controversial, argue	3	4	2	4	3	3	Moved passed debate, well accepted
Not practical	5	5	3	4	1	5	Looking at the facts at hand
Give hope	5	5	2	4	1	5	Not pro-interpretation, matter of fact
Depending on group mathematicians, physical scientists	1	1	3	2	5	1	Appeals to humanities, believe in people
Advantageous	1	2	2	2	4	2	Disadvantageous
Compatible with my beliefs	1	1	2	2	4	3	Incompatible with my beliefs
Simple	3	3	1	2	3	3	Complex
Observable	4	1	2	2	4	4	Hidden
Scarcely known	3	4	4	3	4	4	Widely known

Maria

Similarity Pole	Big bang theory	Evolutionary	Cognitive development	Telepathy	Rationalism	Music theory	Contrast Pole
1 ←							→ 5
Publicize into TV	1	2	3	5	5	5	Hasn't been so publicized
Learning in school	2	1	3	5	2	3	Not taught in school
Controversy	1	2	5	1	5	4	Harmony
So much literature	2	2	1	5	3	3	Out on a limb
Not experienced by people	3	3	5	1	2	4	Social behaviour
No real proof	4	4	4	1	5	4	Logic
Minority (audience)	5	5	4	2	2	2	Majority
Objectivity	3	1	2	5	1	2	Superstitions; faith
Hard time pinpointing	5	5	4	2	2	2	Easy to pin down
Advantageous	2	1	2	3	1	2	Disadvantageous
Compatible with my beliefs	1	1	1	1	1	3	Incompatible with my beliefs
Simple	3	4	5	4	5	3	Complex
Observable	4	2	1	5	4	3	Hidden
Scarcely known	3	5	3	5	4	5	Widely known

Mike

Similarity Pole	General relativity	Big bang theory	Welfare state	Behaviourism	Music theory	Social contract theory	Contrast Pole
1 ←							→ 5
Not willing to accept if they don't have concrete proof, 'iffy'	2	4	4	3	3	5	Proof in itself
Curious about where we came from	3	1	3	2	2	2	People just don't care
Not interesting	2	4	3	3	4	4	People connect with it
It's correct	4	2	2	2	2	1	No concrete proof
Don't need knowledge about it	4	3	2	2	2	3	Complicated
Makes people feel good, connected	5	3	2	2	2	3	Need knowledge to talk about it; split room
Just now realizing it	5	5	5	3	3	1	Around for a long time
Advantageous	2	2	3	2	1	1	Disadvantageous
Compatible with my beliefs	3	1	1	1	2	1	Incompatible with my beliefs
Simple	3	2	2	2	3	1	Complex
Observable	4	1	2	2	3	2	Hidden
Scarcely known	4	3	4	4	5	5	Widely known

Neal

Similarity Pole	Big bang theory	Evolutionary theory	Telepathy	Spontaneous generation	Idealism	Social contract theory	Contrast Pole
1 ←							→ 5
General media (documentaries, news)	1	2	4	3	5	2	Not talked about in media
Generally accepted	1	2	5	5	3	2	Not generally accepted
Presented as fact	1	1	4	4	3	2	Fantasy, not presented as fact
You can make sense of it	3	2	4	5	3	2	Doesn't make sense
No physical attributes	3	4	1	1	1	1	Physical attributes that you can see
Something to personally think about	2	1	4	4	1	2	Ability, can't do what it explains
Proven in front of you	3	2	4	3	4	2	Wouldn't be able to show you proof
Advantageous	3	2	1	3	3	4	Disadvantageous
Compatible with my beliefs	2	2	4	5	3	2	Incompatible with my beliefs
Simple	2	1	3	4	4	3	Complex
Observable	3	2	5	4	4	2	Hidden
Scarcely known	3	5	5	3	4	5	Widely known

Paul

Similarity Pole	Evolutionary	General relativity	Welfare state	Spontaneous generation	Rationalism	Idealism	Contrast Pole
1 ←							→ 5
Can't disprove it	3	4	3	5	5	5	New theories that can explain it better or disprove it
Religion disagrees	5	4	3	1	3	3	Proven by science
Want to believe it	2	1	5	5	3	1	Don't faith have in it
Didn't explain things well	3	4	3	5	3	2	Got stuck; couldn't find more evidence
People like thinking they're right	2	5	3	5	3	2	Couldn't prove they were right
Positive way of looking at things	2	2	4	3	2	2	Bad outlook
Advantageous	1	1	3	3	1	1	Disadvantageous
Compatible with my beliefs	1	2	4	3	1	1	Incompatible with my beliefs
Simple	3	4	2	4	2	2	Complex
Observable	2	5	2	5	1	1	Hidden
Scarcely known	5	4	4	3	4	4	Widely known

Reg

Similarity Pole	Evolutionary theory	String theory	Cognitive development	Behaviourism	Idealism	Agnosticism	Contrast Pole
1 ←							→ 5
Affects religious beliefs	1	3	5	4	3	1	No specific beliefs getting in the way
External	1	1	4	4	4	5	Internal
Conscious pursuit of knowledge	1	1	3	3	5	3	Through life experience
Embedded in general educational system	2	1	3	3	5	4	Not dealt with in general educational system
Personal development	5	5	2	2	3	2	No individual control
Lots of research	4	5	3	3	4	2	Belief, conversation
Already have a belief about it	2	5	3	3	3	4	Change of minds
Not of great interest	5	3	4	3	2	4	Of interest to world of science and religion
Many people relate to	1	5	2	2	1	1	Doesn't apply to average person's life
Advantageous	1	1	1	1	1	1	Disadvantageous
Compatible with my beliefs	1	2	1	4	4	5	Incompatible with my beliefs
Simple	2	5	3	2	2	1	Complex
Observable	1	5	3	1	1	3	Hidden
Scarcely known	5	5	3	4	4	5	Widely known

Taryn

Similarity Pole	Big bang theory	Molecular theory	Behaviourism	Welfare state	Speech act	Music theory	Contrast Pole
1 ←							→ 5
Popular in media	2	5	4	3	2	1	Not advertised in media
Discussed in schools	4	1	3	4	2	3	Different environment
Used in businesses	3	2	5	3	4	4	Used in every day life
Common issue among people	5	3	2	2	1	3	Different tastes around it
Advantageous	3	2	1	4	1	2	Disadvantageous
Compatible with my beliefs	3	1	1	2	1	1	Incompatible with my beliefs
Simple	4	4	3	2	3	2	Complex
Observable	4	2	1	5	4	1	Hidden
Scarcely known	3	4	4	4	3	5	Widely known

Trennick

Similarity Pole	Lunar theory	Big bang theory	Theism	Welfare state	Agnosticism	Rationalism	Contrast Pole
1 ←							→ 5
Not controversial	1	2	5	3	4	2	Controversial
Interesting to people who are affected by it	1	4	2	5	4	3	Affects everybody
Indirectly involved in day to day life	1	2	4	3	4	4	Affects most people everyday
Scientific consensus	1	2	5	4	1	4	Not much backing
Deeper meaning of interest	5	2	1	5	4	3	People don't want an answer
Uncertainty filled with feelings	5	4	1	2	2	3	Not discomforting to know answer
Not scary	1	2	4	4	4	1	Scary idea
Told more truthfully/factually	1	3	5	4	2	2	Lied about
Upsetting	3	4	5	2	1	4	Comforting
Coming into question	5	3	1	4	2	4	Little resistance
Scientific accuracy and objectivity	1	2	5	2	2	3	Less evidence for it
Lack of benefit	3	2	3	4	5	5	Benefit
Herd enforcement	2	2	1	5	4	2	Do not want you to believe
Advantageous	4	2	2	2	1	1	Disadvantageous
Compatible with my beliefs	1	1	5	4	1	1	Incompatible with my beliefs
Simple	3	5	1	3	2	4	Complex
Observable	1	3	1	2	4	3	Hidden
Scarcely known	2	3	4	4	5	4	Widely known

T

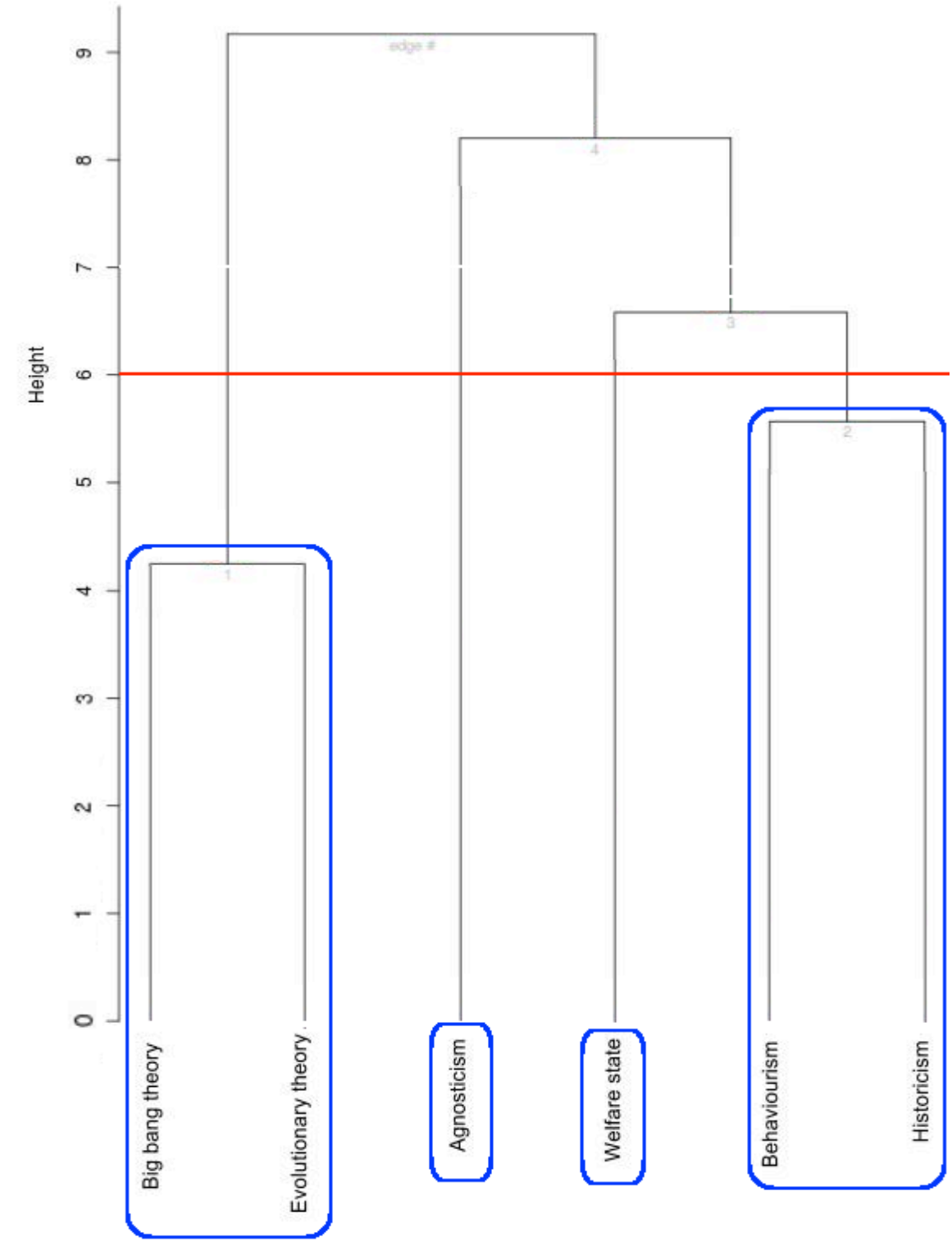
Similarity Pole	Evolutionary theory	Big bang theory	Telepathy	Cognitive development	Music theory	Anthroposophy	Contrast Pole
1 ←							→ 5
It can be seen	3	5	5	3	1	4	All in the mind, how would you test it?
Opposition to creationism	1	3	1	3	1	2	Closer to creationism
Just accepted it	1	1	5	3	1	4	Questioned, out of the norm
Talked about for so long	1	2	4	5	1	1	Recent, gradual change in society
Can't be proven	3	1	1	4	5	3	Tangible, provable, physically seen
Unbelievable	4	3	1	3	5	4	Makes sense, used, believable
Think it moves society forward, kinder	2	5	4	1	3	4	In the past, can't use for social development
Standardized	2	2	5	4	1	3	Unstandardized, individual
Everything makes sense because of it	1	3	5	2	1	3	Not sure about, grey area
Tedious, many components	3	5	2	2	1	4	One event, not as complex
Practise it	5	5	4	2	1	2	How would you practise it?
Advantageous	2	2	3	1	1	2	Disadvantageous
Compatible with my beliefs	1	2	4	2	1	3	Incompatible with my beliefs
Simple	4	4	3	5	5	3	Complex
Observable	2	4	4	2	1	4	Hidden
Scarcely known	5	3	5	3	5	3	Widely known

Yakov

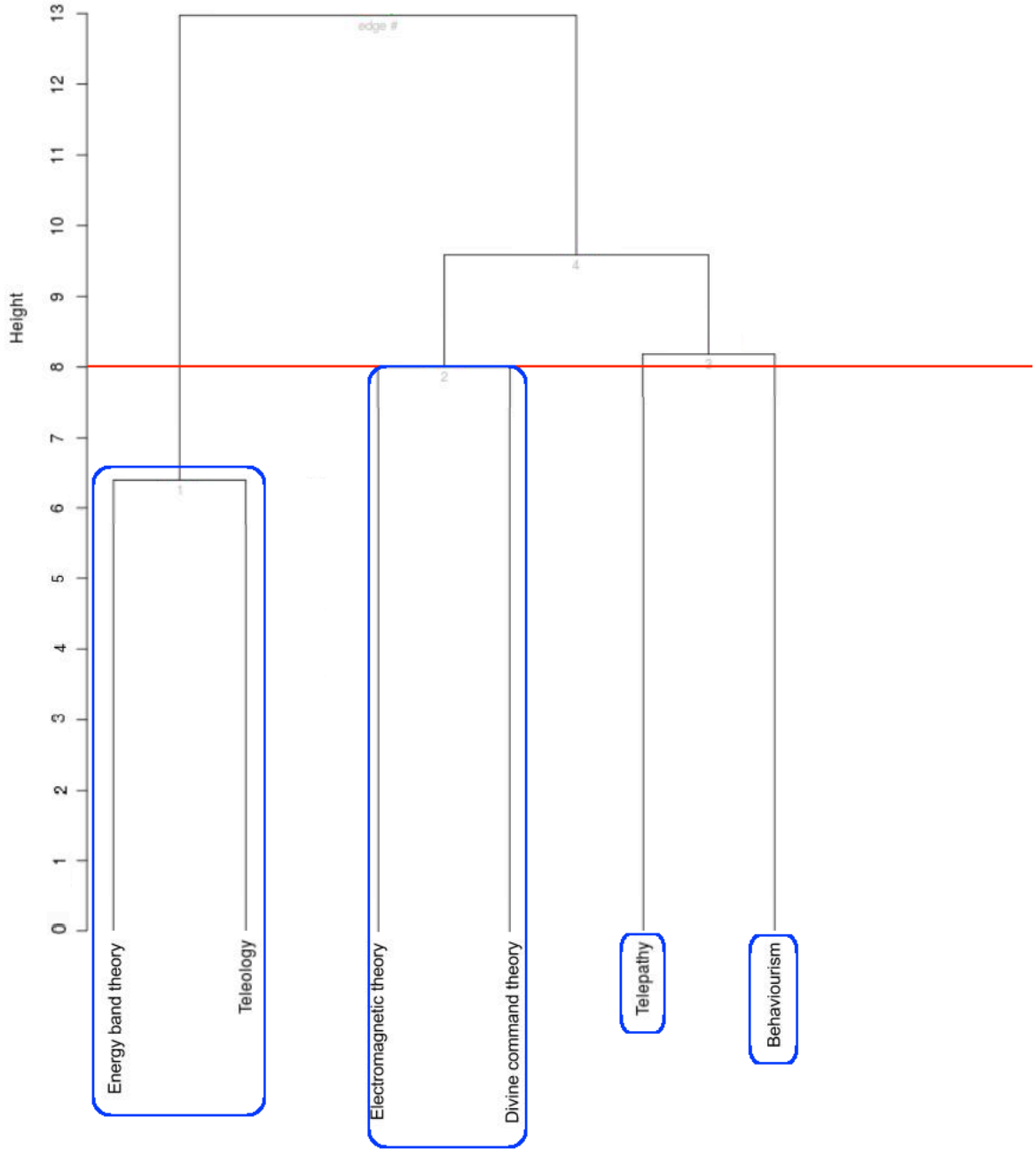
Similarity Pole	Electromagnetic theory	Energy band	Welfare state	Telepathy	Music theory	Idealism	Contrast Pole
1 ←							→ 5
Allows communication	1	2	3	2	3	4	Communication not allowed or not needed
If we didn't have it we wouldn't have progress	1	1	4	3	3	5	Don't see need for progress
Everyone is benefited by it	3	3	1	5	3	4	Only few people can use it
Was proven	1	1	4	5	2	5	Never proven
Used in real world	1	1	2	5	2	5	Can't live in an ideal world
Denying what really is	3	5	4	2	4	1	Right there in front of you
Advantageous	2	2	1	3	2	4	Disadvantageous
Compatible with my beliefs	1	1	4	5	3	5	Incompatible with my beliefs
Simple	5	5	3	4	2	1	Complex
Observable	4	5	3	5	2	5	Hidden
Scarcely known	4	2	4	5	5	4	Widely known

Appendix 5: Element Tree Diagrams

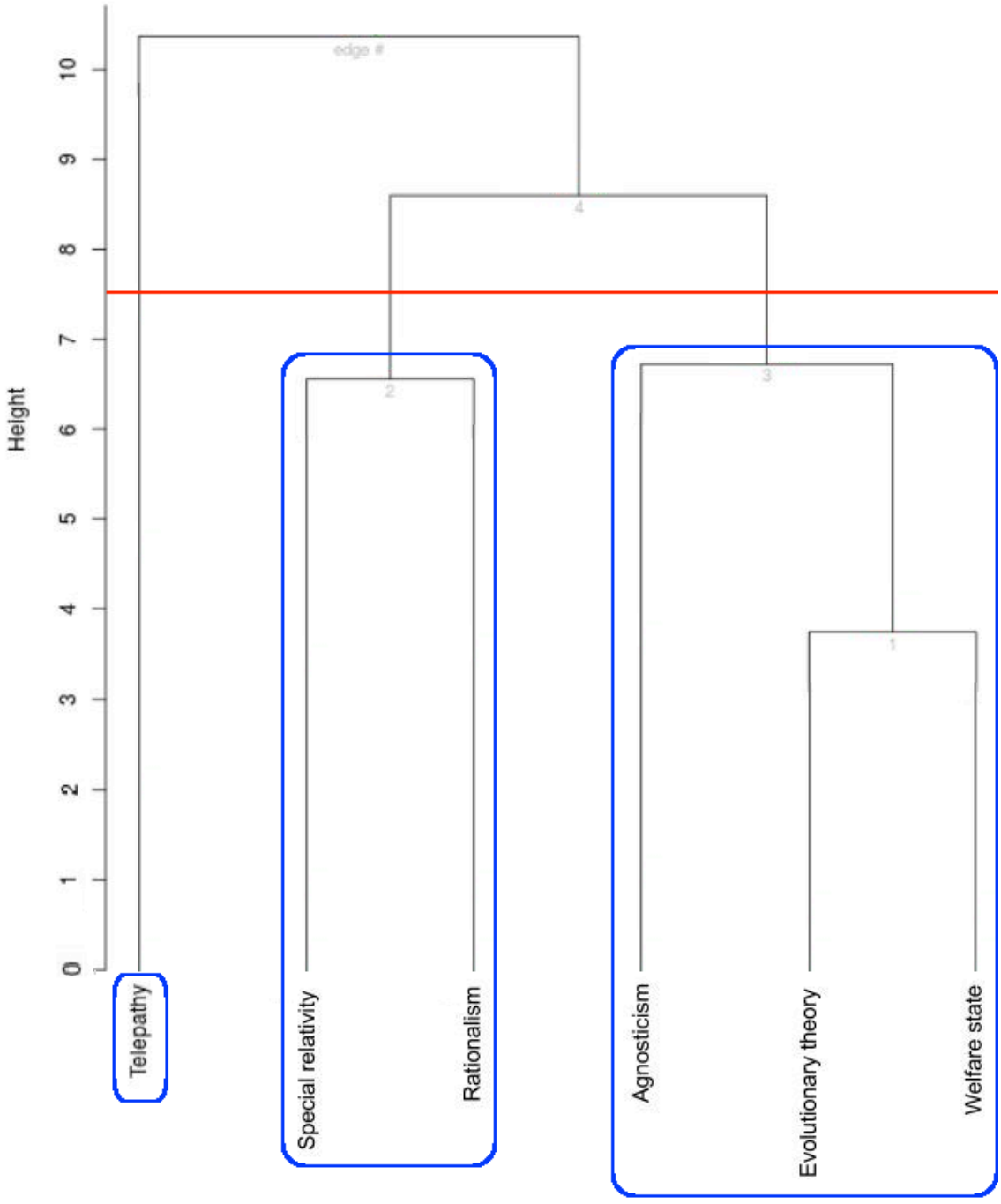
Aaron



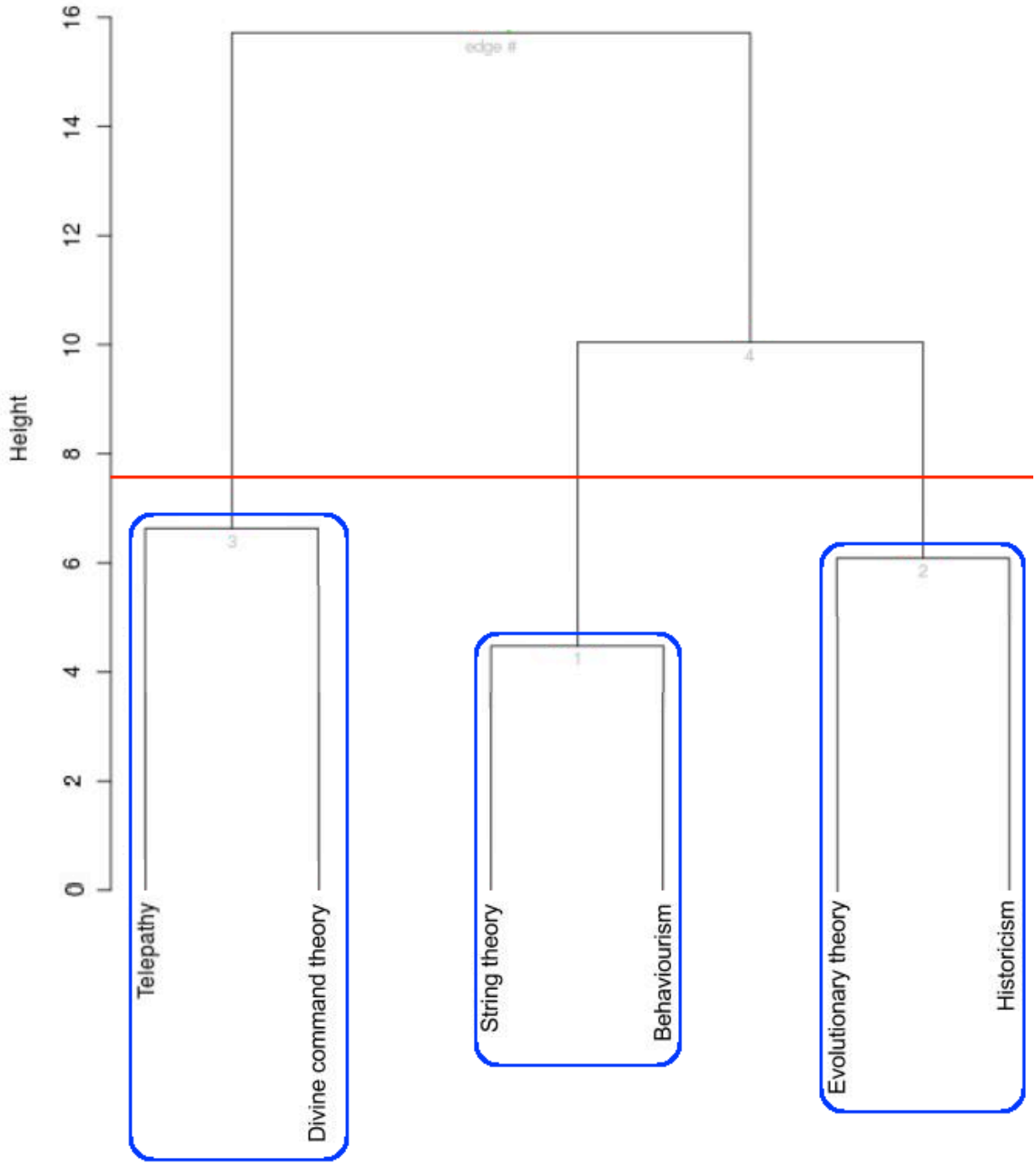
Alabi


Height
0
1
2
3
4
5
6
7
8
9
10
11
12
13
edge #
1
2
3
4
Energy band theory
Teleology
Electromagnetic theory
Divine command theory
Telepathy
Behaviourism

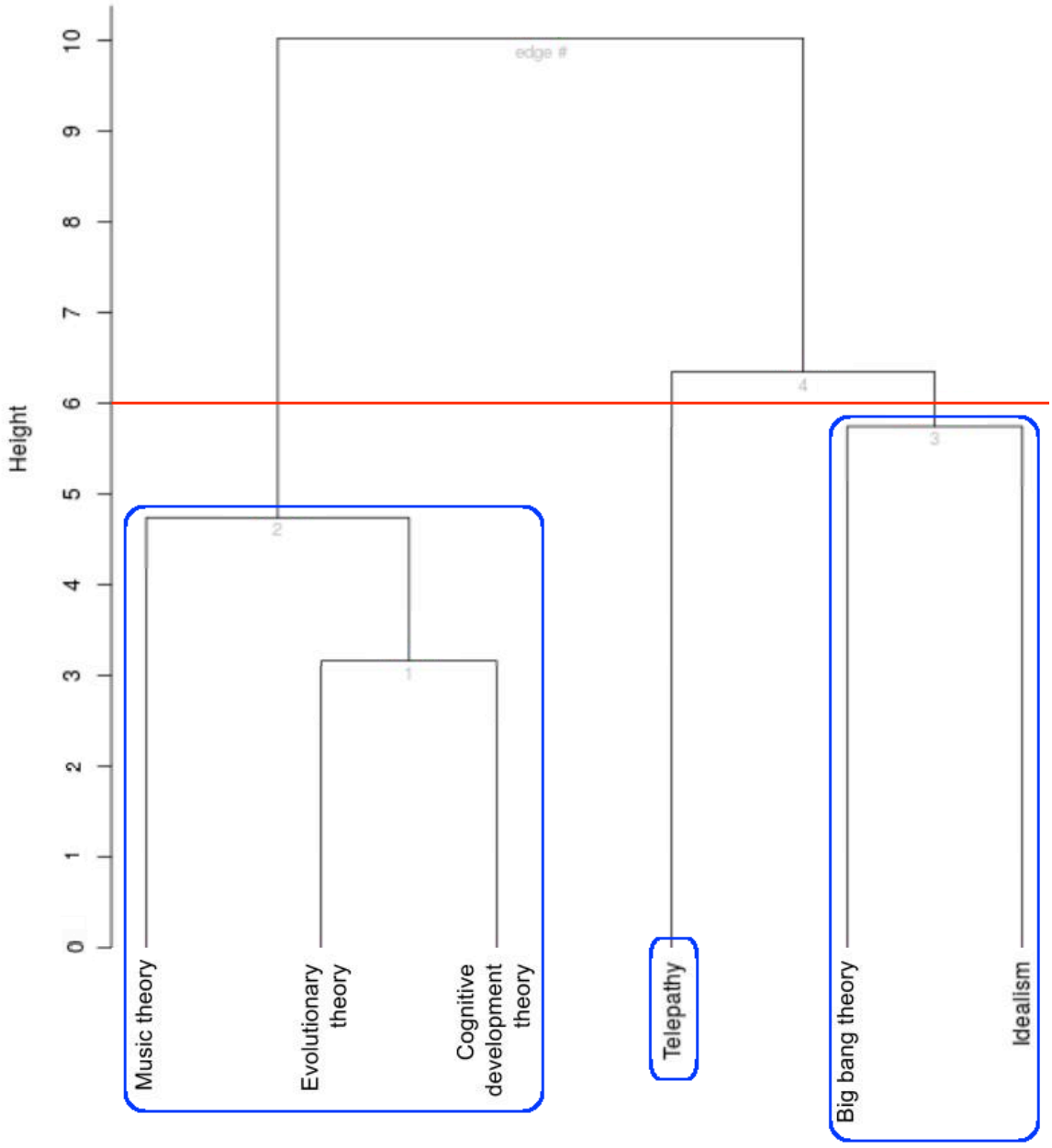
Arianna


edge #
Height
0
1
2
3
4
5
6
7
8
9
10
Telepathy
Special relativity
Rationalism
Agnosticism
Evolutionary theory
Welfare state

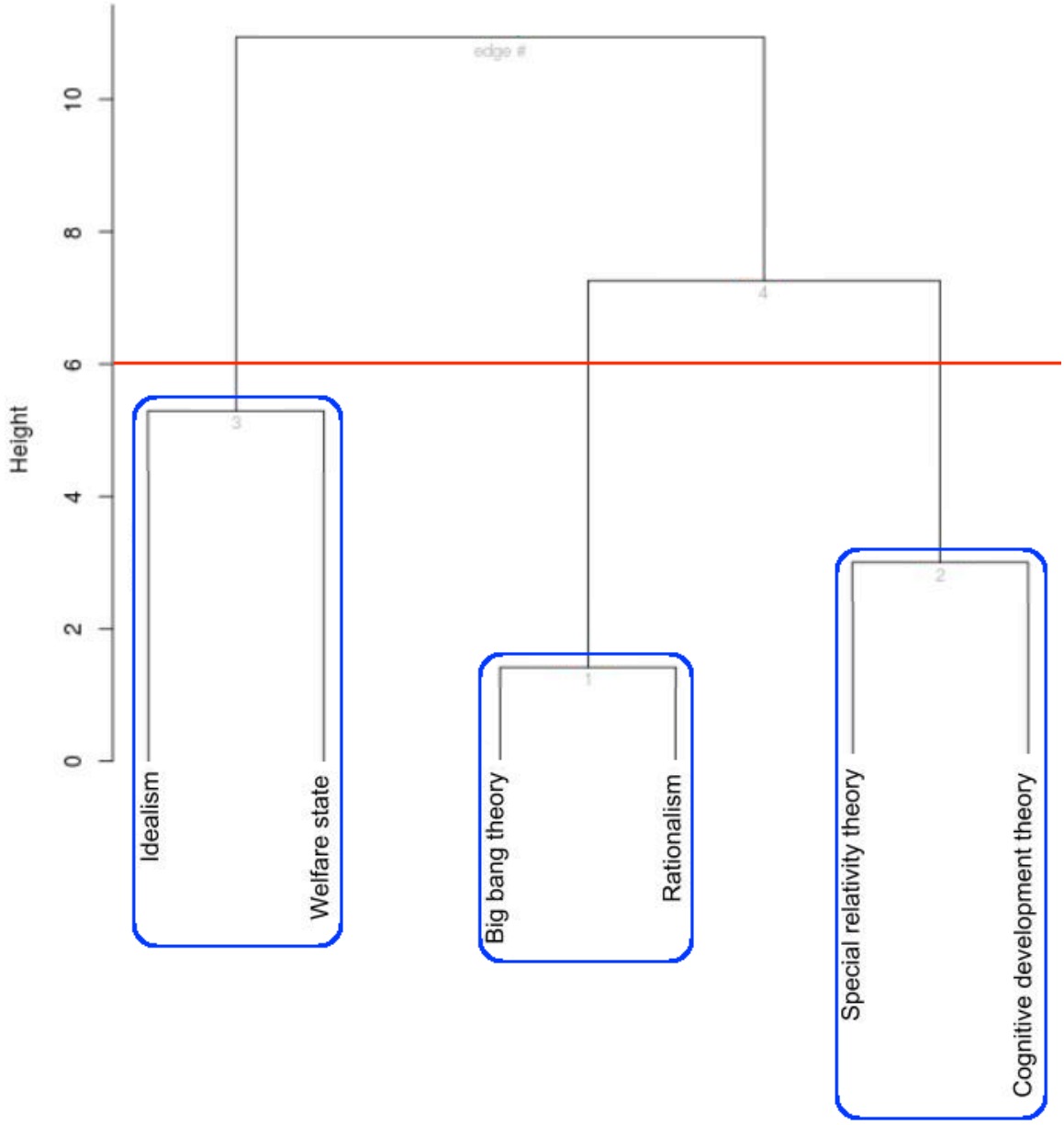
Étienne


Height
0
2
4
6
8
10
12
14
16
edge #
4
3
2
1
Telepathy
Divine command theory
String theory
Behaviourism
Evolutionary theory
Historicism

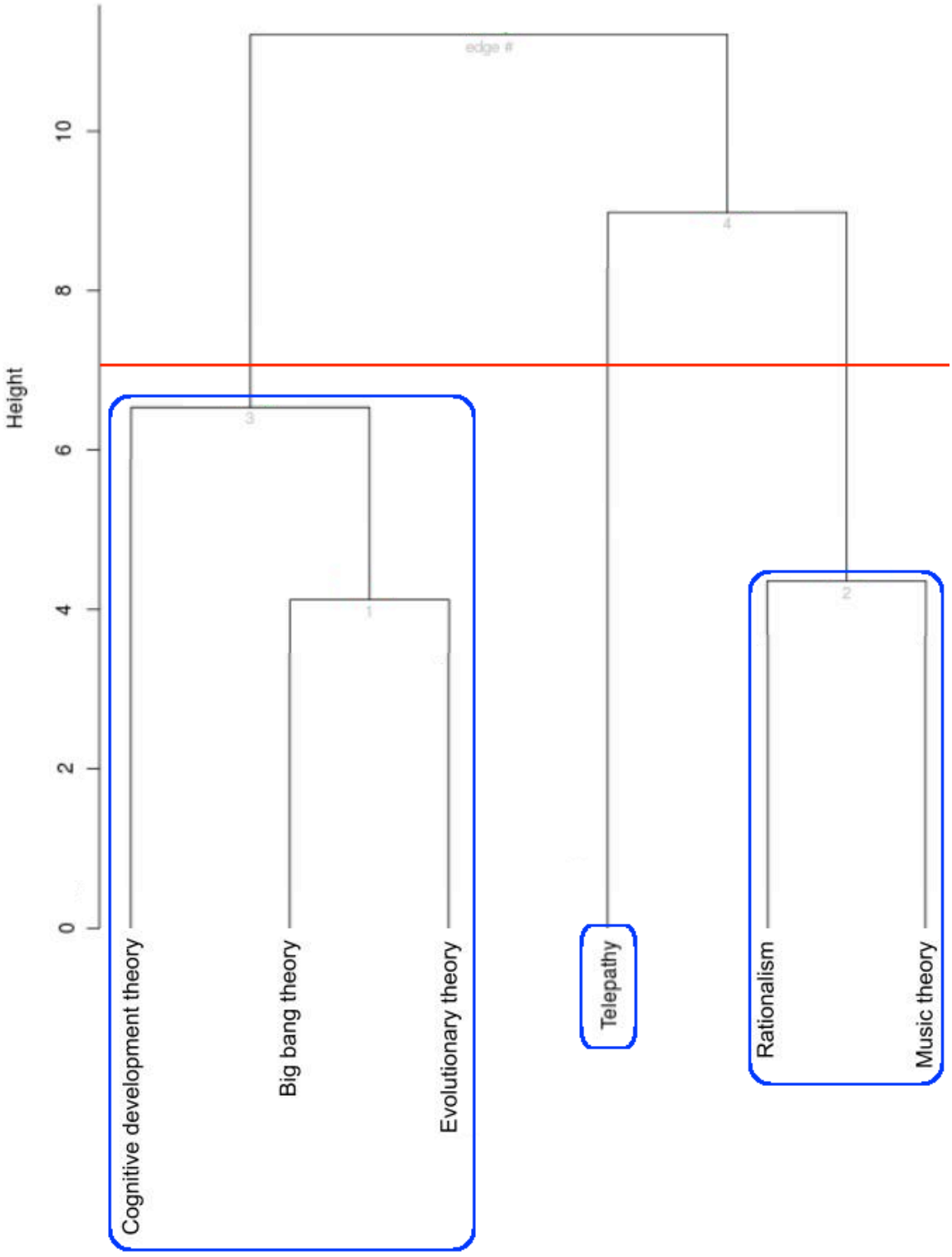
Evelina


Height
0
1
2
3
4
5
6
7
8
9
10
edge #
2
1
4
3
Music theory
Evolutionary theory
Cognitive development theory
Telepathy
Big bang theory
Idealism

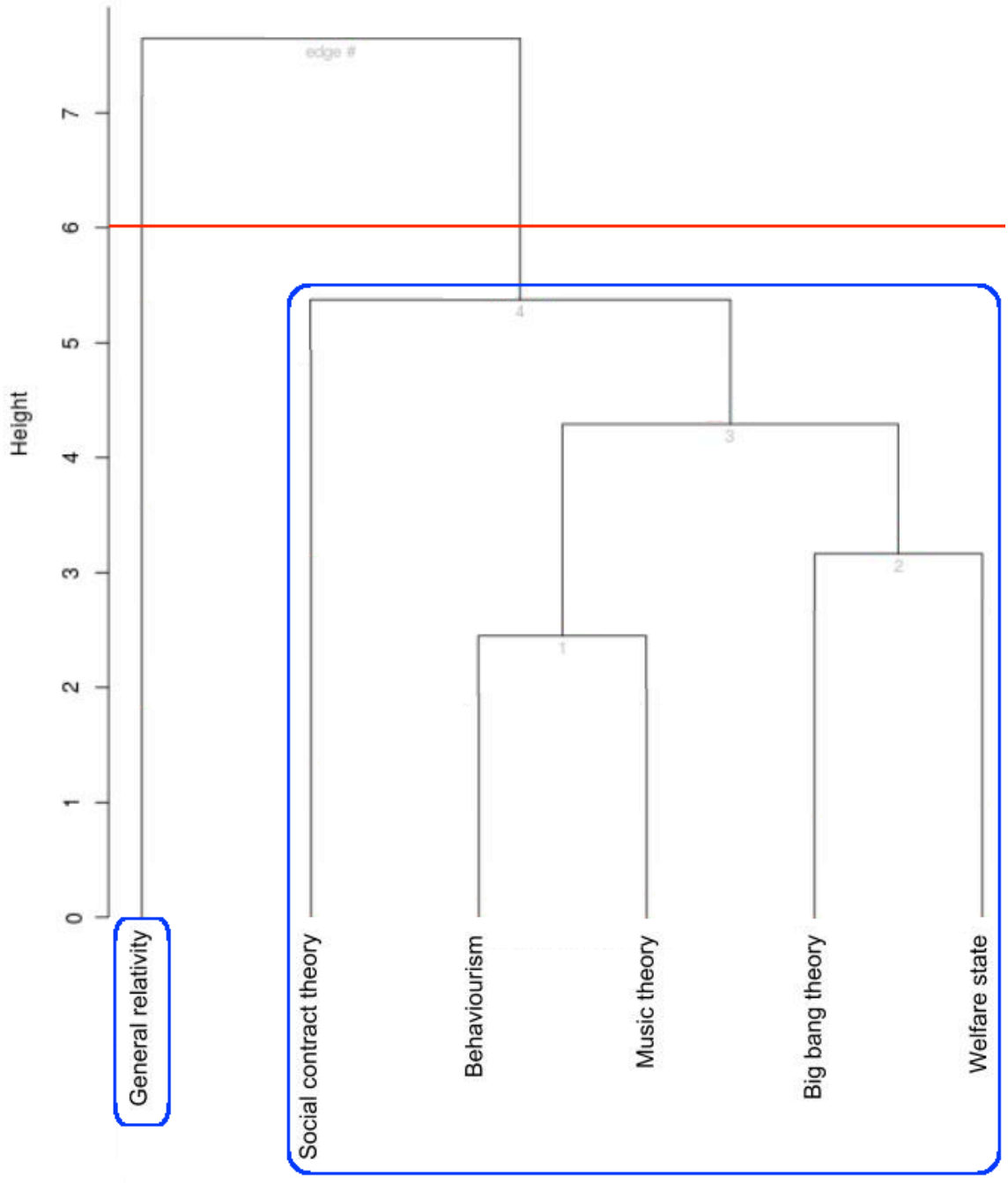
Jacob


edge #
Height
0
2
4
6
8
10
3
4
1
2
Idealism
Welfare state
Big bang theory
Rationalism
Special relativity theory
Cognitive development theory

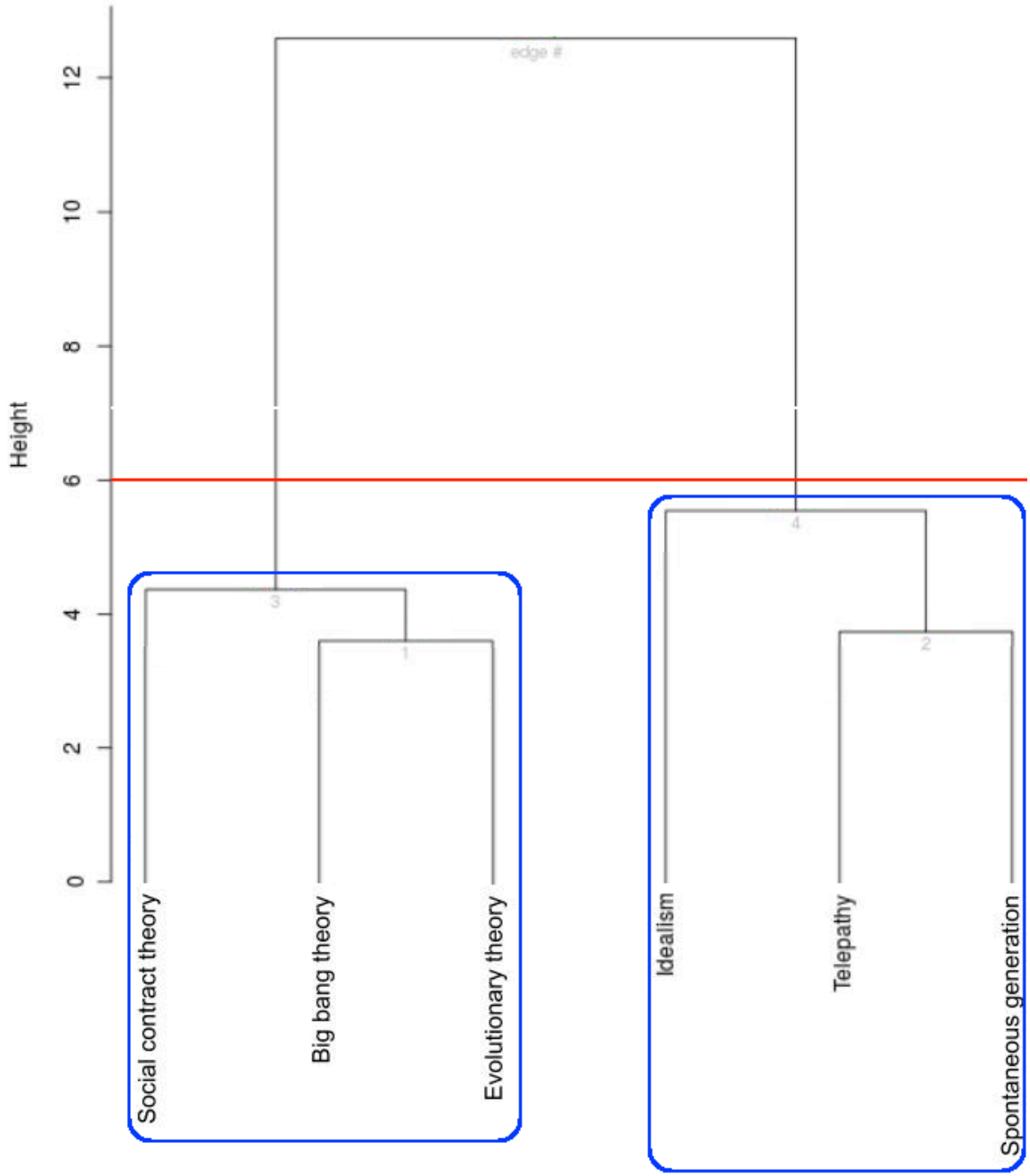
Maria


Height
0
2
4
6
8
10
edge #
3
1
4
2
Cognitive development theory
Big bang theory
Evolutionary theory
Telepathy
Rationalism
Music theory

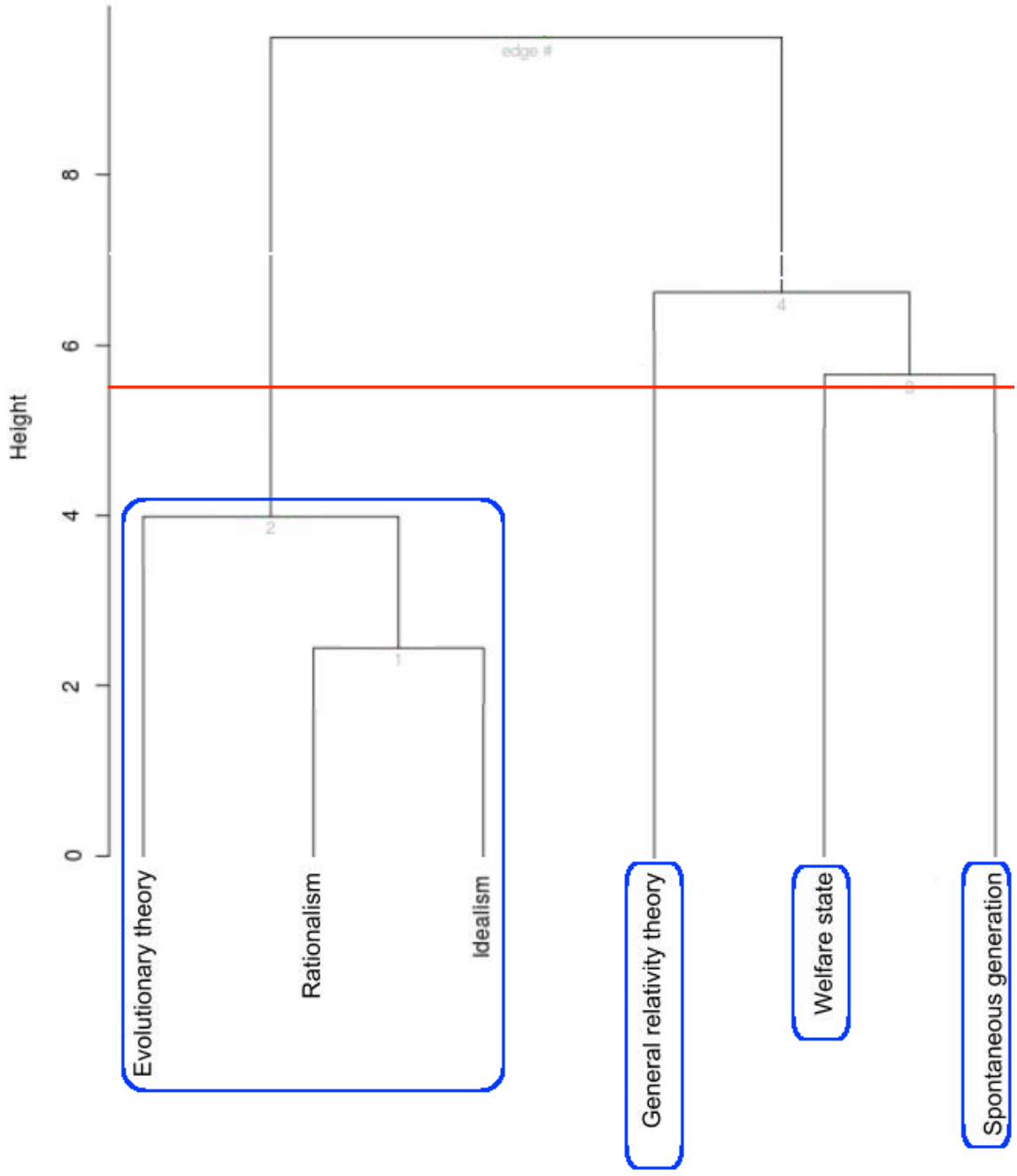
Mike


edge #
Height
0
1
2
3
4
5
6
7
General relativity
Social contract theory
Behaviourism
Music theory
Big bang theory
Welfare state
1
2
3
4

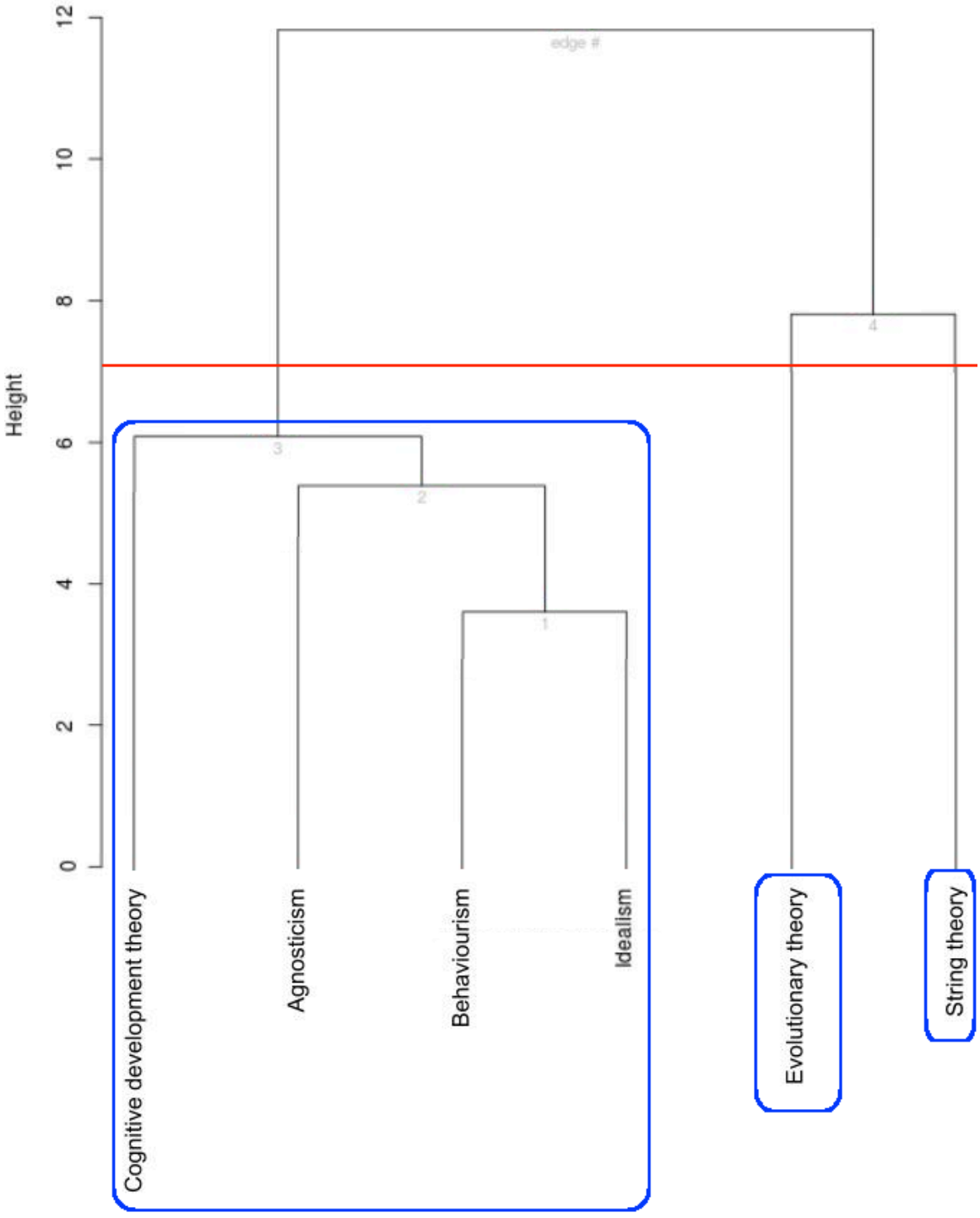
Neal


Height
0
2
4
6
8
10
12
edge #
3
1
4
2
Social contract theory
Big bang theory
Evolutionary theory
Idealism
Telepathy
Spontaneous generation

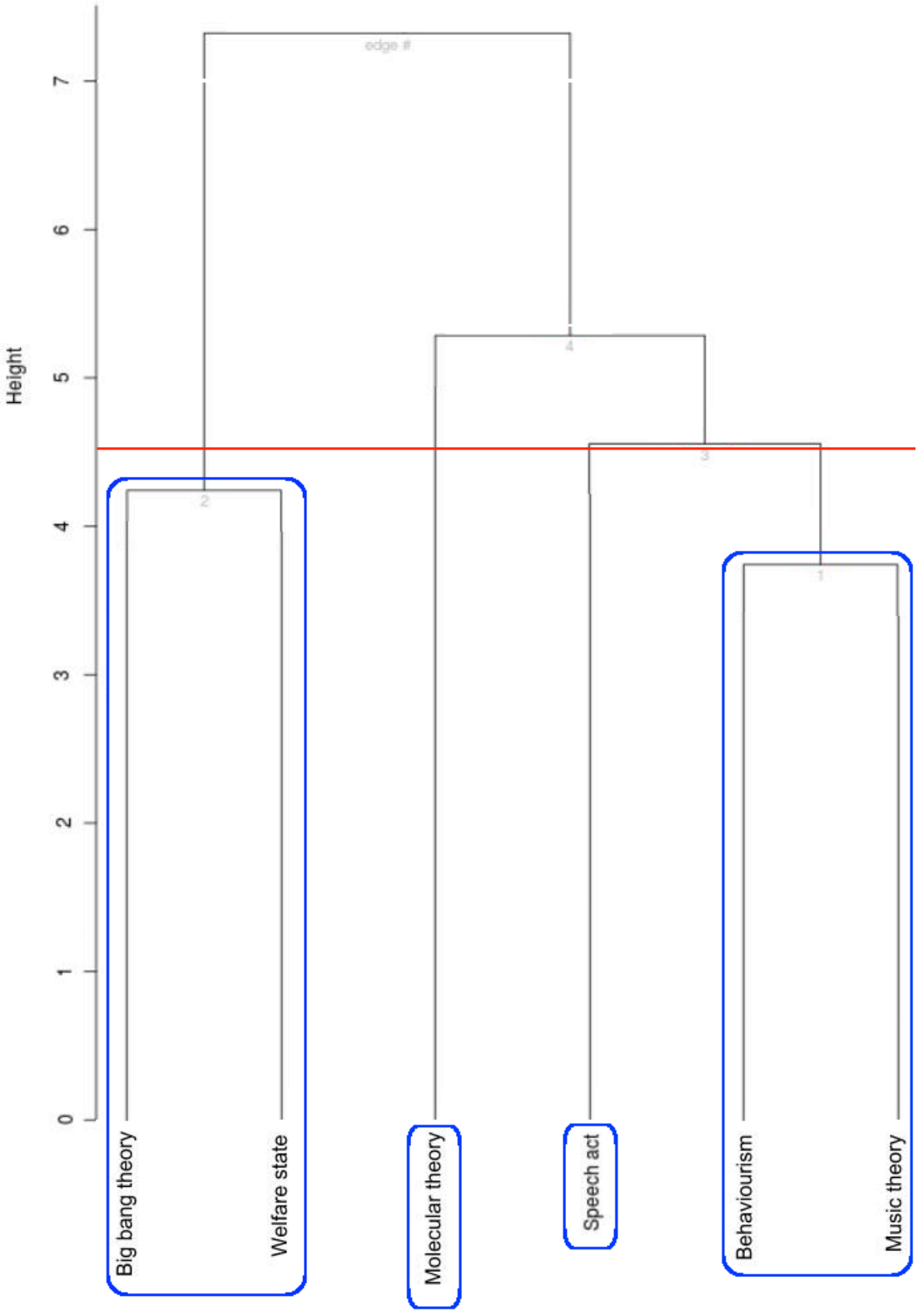
Paul

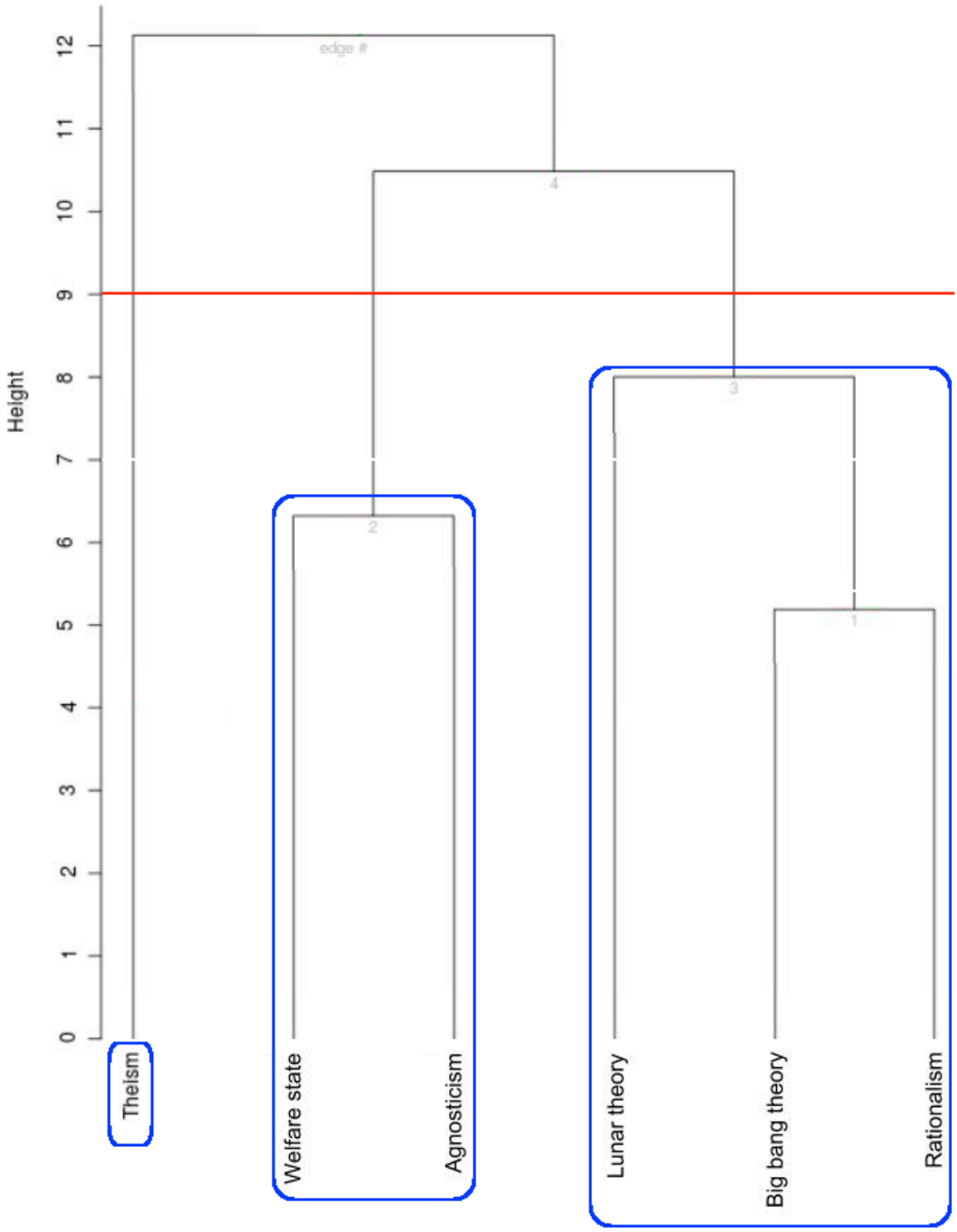

Height
0
2
4
6
8
edge #
2
1
4
3
Evolutionary theory
Rationalism
Idealism
General relativity theory
Welfare state
Spontaneous generation

Reg

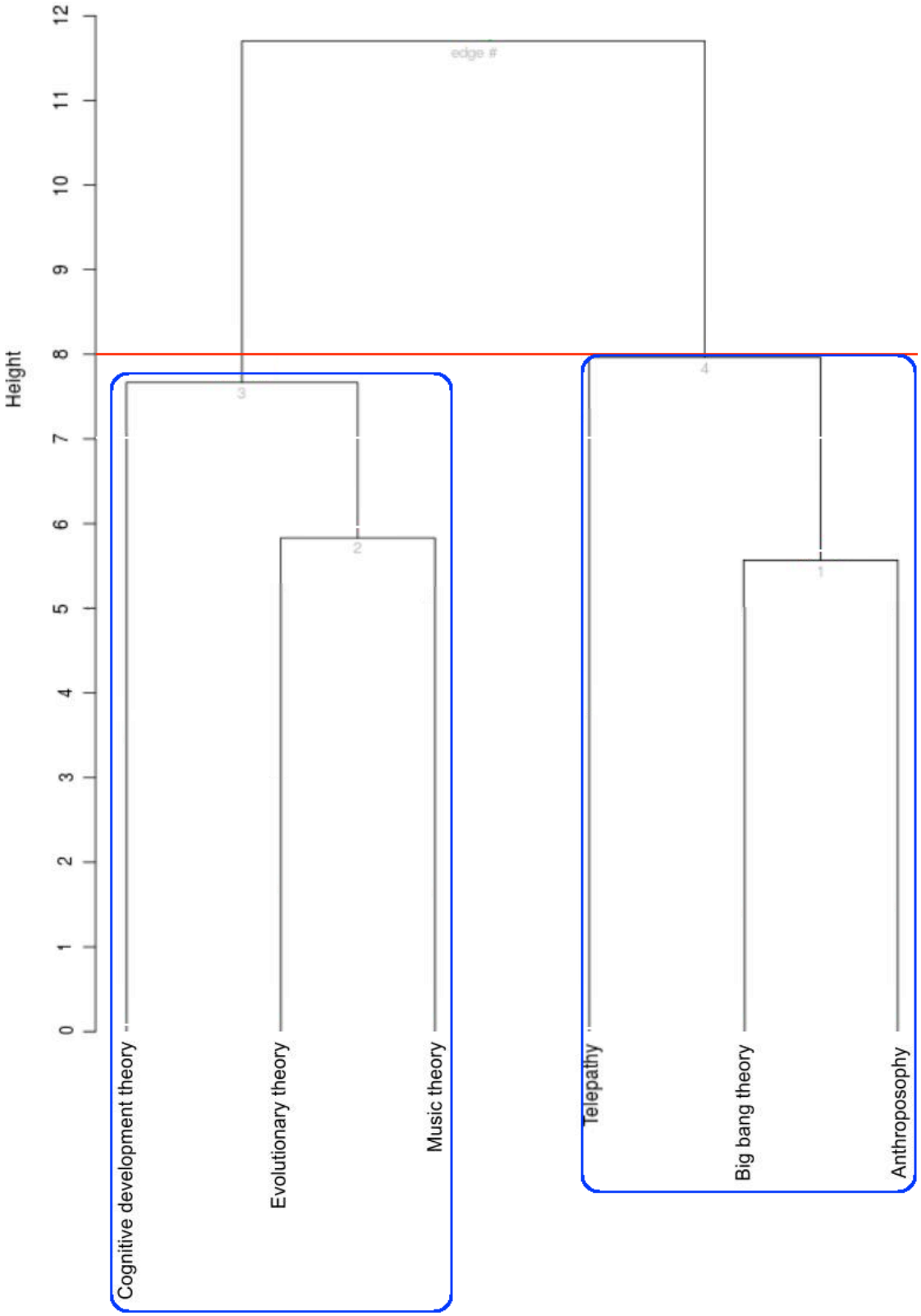

Height
0
2
4
6
8
10
12
edge #
3
2
1
4
Cognitive development theory
Agnosticism
Behaviourism
Idealism
Evolutionary theory
String theory

Taryn

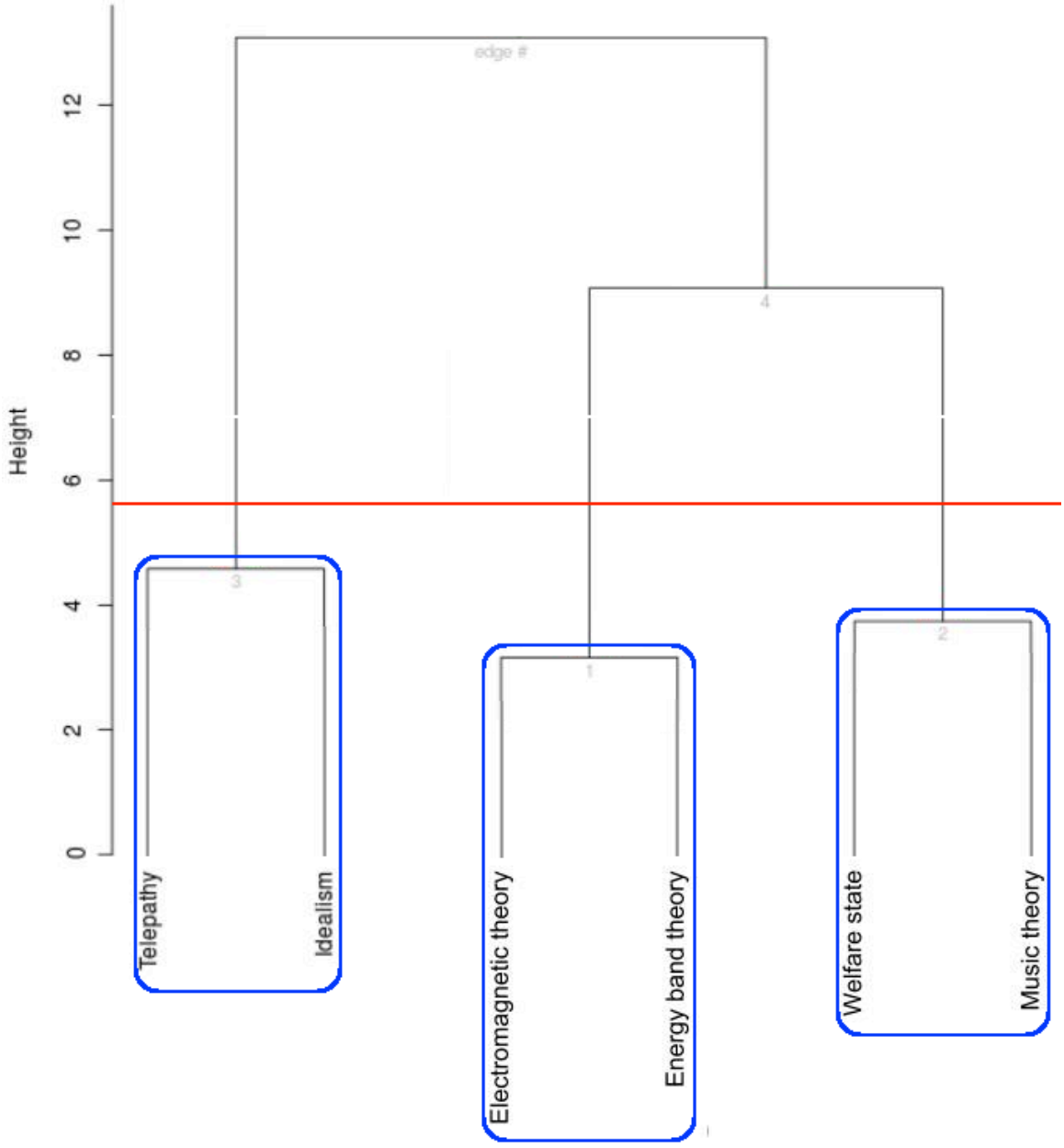

Height
0
1
2
3
4
5
6
7
edge #
Big bang theory
Welfare state
Molecular theory
Speech act
Behaviourism
Music theory


Height
0
1
2
3
4
5
6
7
8
9
10
11
12
edge #
4
3
2
1
Theism
Welfare state
Agnosticism
Lunar theory
Big bang theory
Rationalism

T

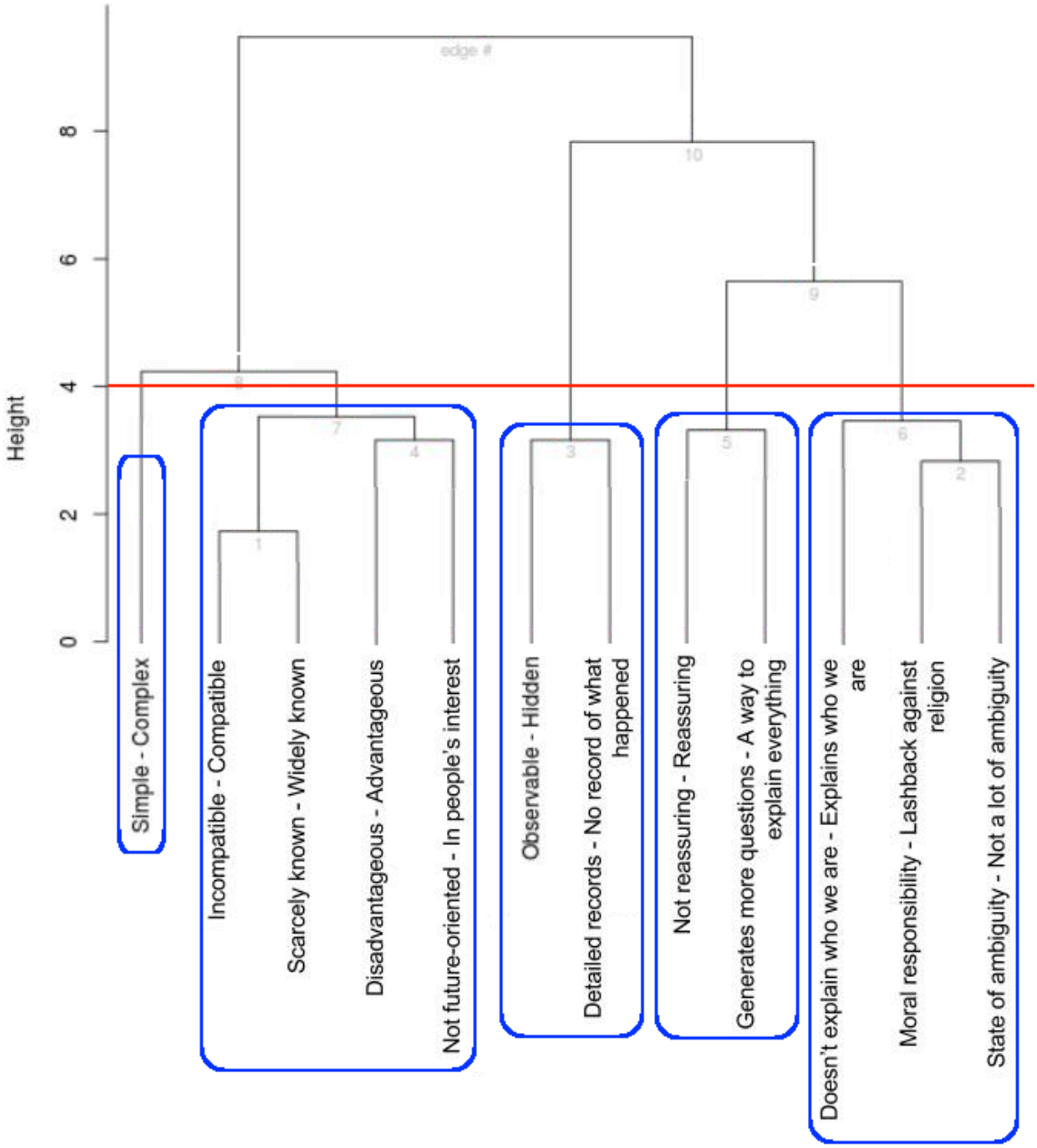

Height
0
1
2
3
4
5
6
7
8
9
10
11
12
edge #
3
2
4
1
Cognitive development theory
Evolutionary theory
Music theory
Telepathy
Big bang theory
Anthroposophy

Yakov

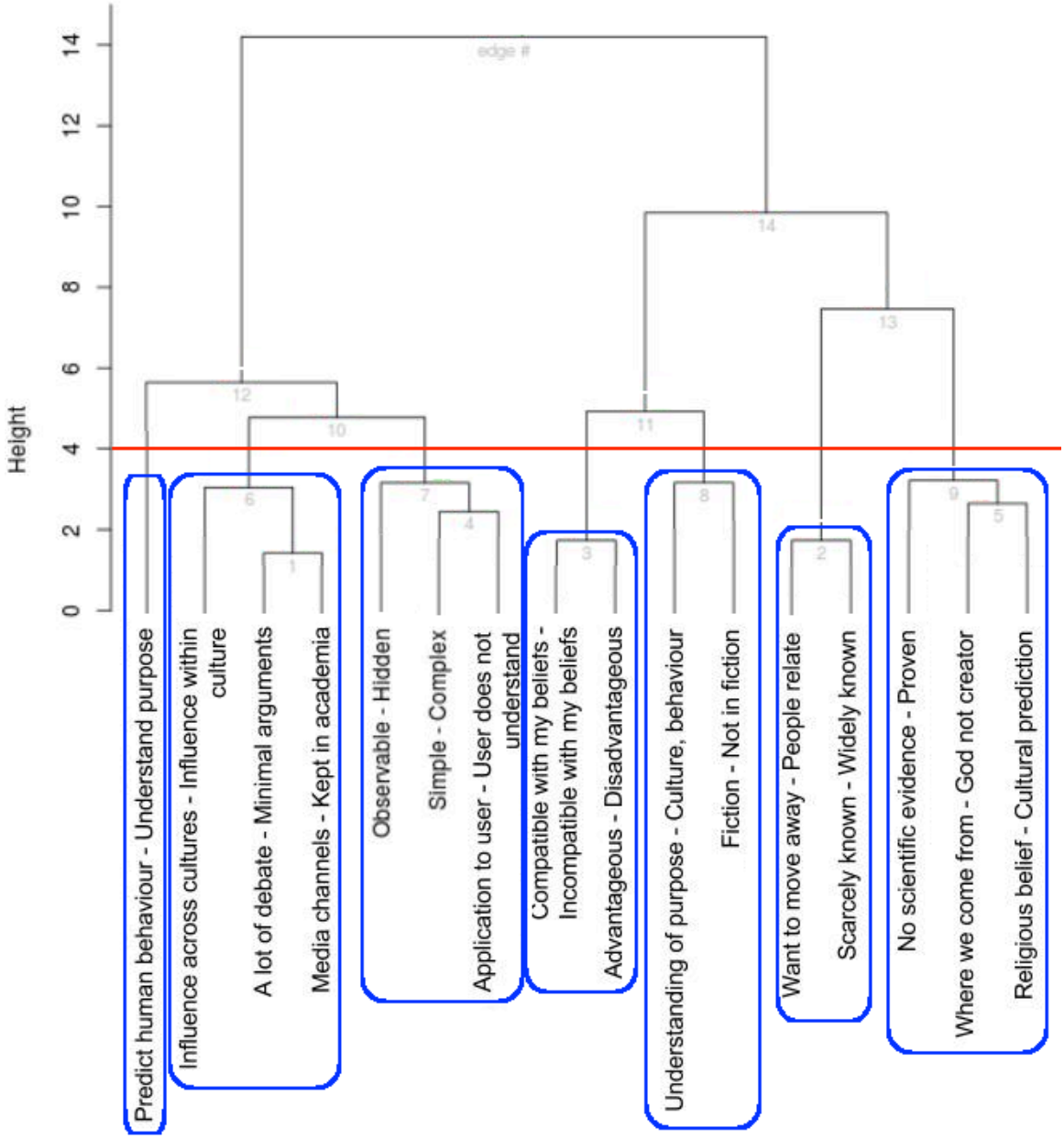

edge #
Height
0
2
4
6
8
10
12
3
4
1
2
Telepathy
Idealism
Electromagnetic theory
Energy band theory
Welfare state
Music theory

Appendix 6: Construct Tree Diagrams

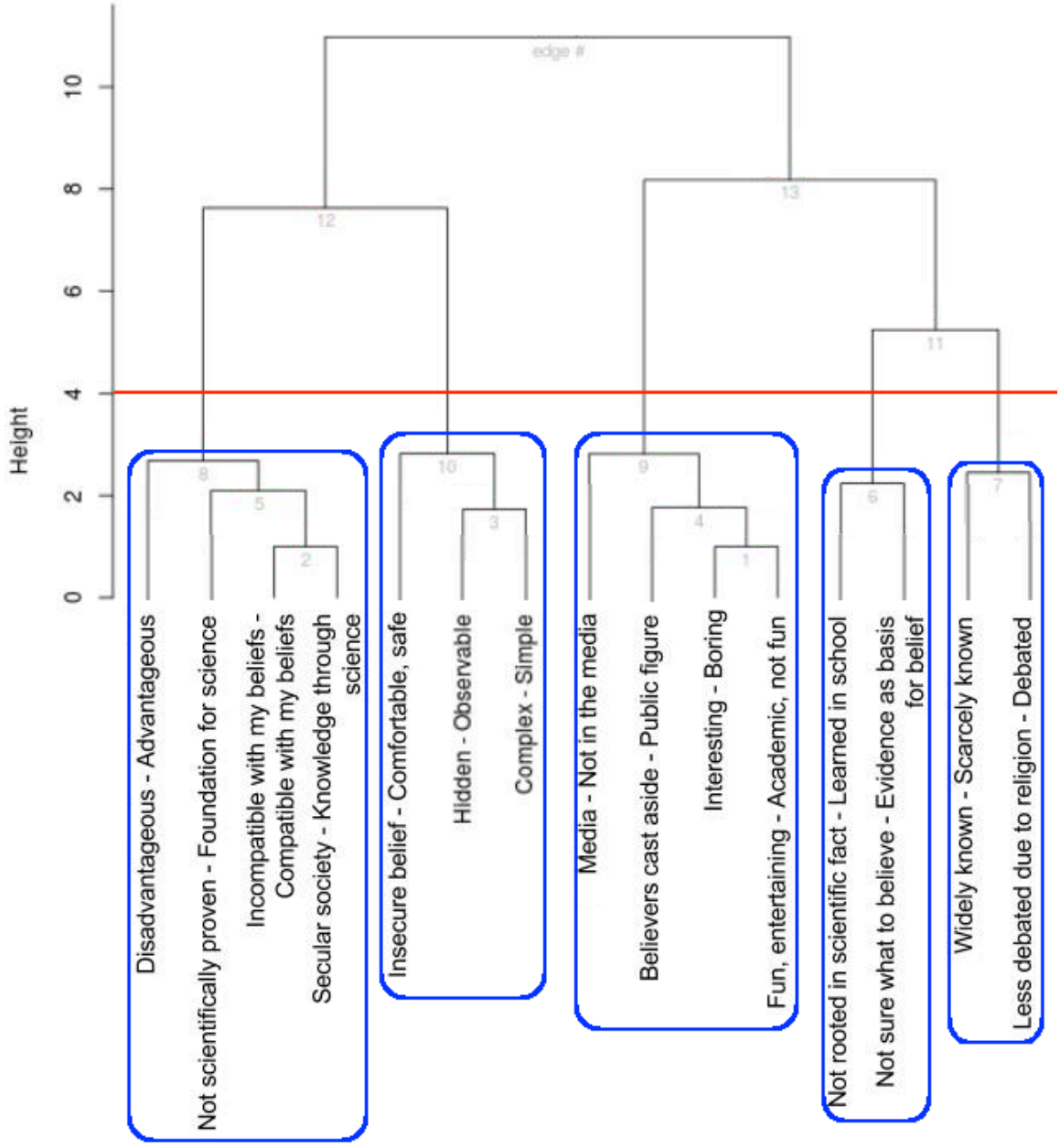
Aaron



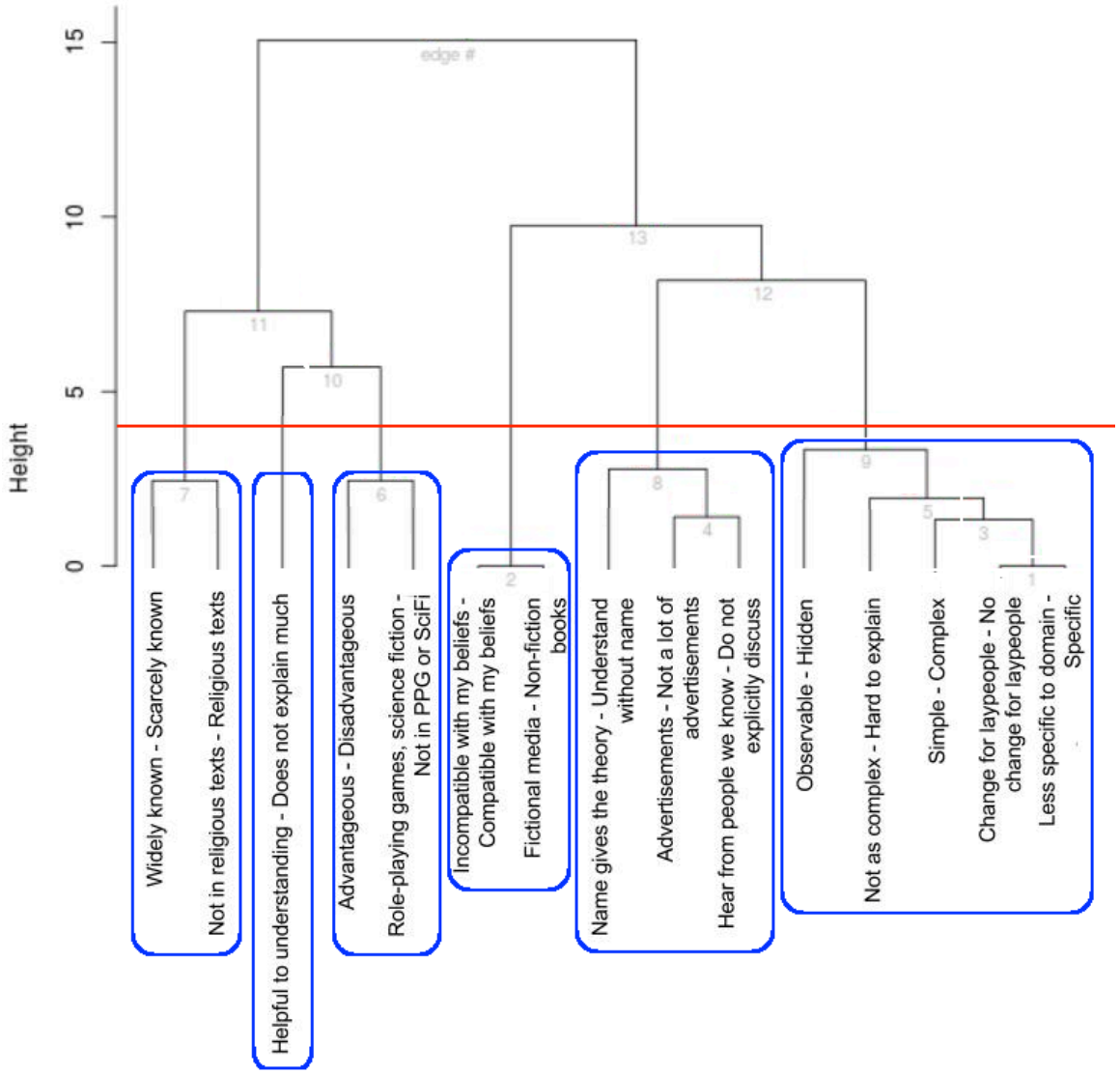
Alabi


Height
0
2
4
6
8
10
12
14
edge #
14
13
12
11
10
9
8
7
6
5
4
3
2
1
Predict human behaviour - Understand purpose
Influence across cultures - Influence within culture
A lot of debate - Minimal arguments
Media channels - Kept in academia
Observable - Hidden
Simple - Complex
Application to user - User does not understand
Compatible with my beliefs - Incompatible with my beliefs
Advantageous - Disadvantageous
Understanding of purpose - Culture, behaviour
Fiction - Not in fiction
Want to move away - People relate
Scarcely known - Widely known
No scientific evidence - Proven
Where we come from - God not creator
Religious belief - Cultural prediction

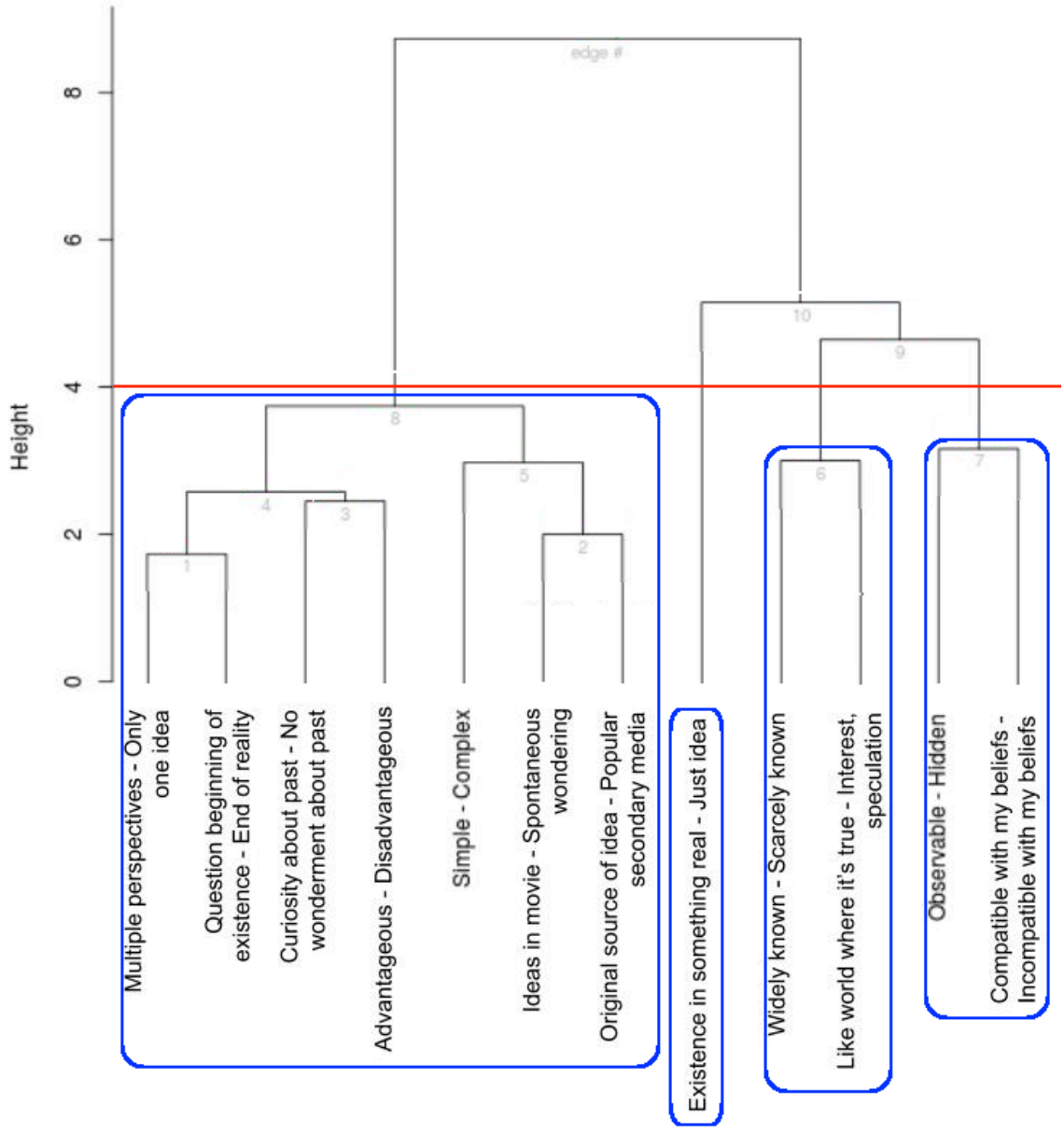
Arianna


Height
0
2
4
6
8
10
edge #
12
13
11
8
5
2
10
3
9
4
1
6
7
Disadvantageous - Advantageous
Not scientifically proven - Foundation for science
Incompatible with my beliefs - Compatible with my beliefs
Secular society - Knowledge through science
Insecure belief - Comfortable, safe
Hidden - Observable
Complex - Simple
Media - Not in the media
Believers cast aside - Public figure
Interesting - Boring
Fun, entertaining - Academic, not fun
Not rooted in scientific fact - Learned in school
Not sure what to believe - Evidence as basis for belief
Widely known - Scarcely known
Less debated due to religion - Debated

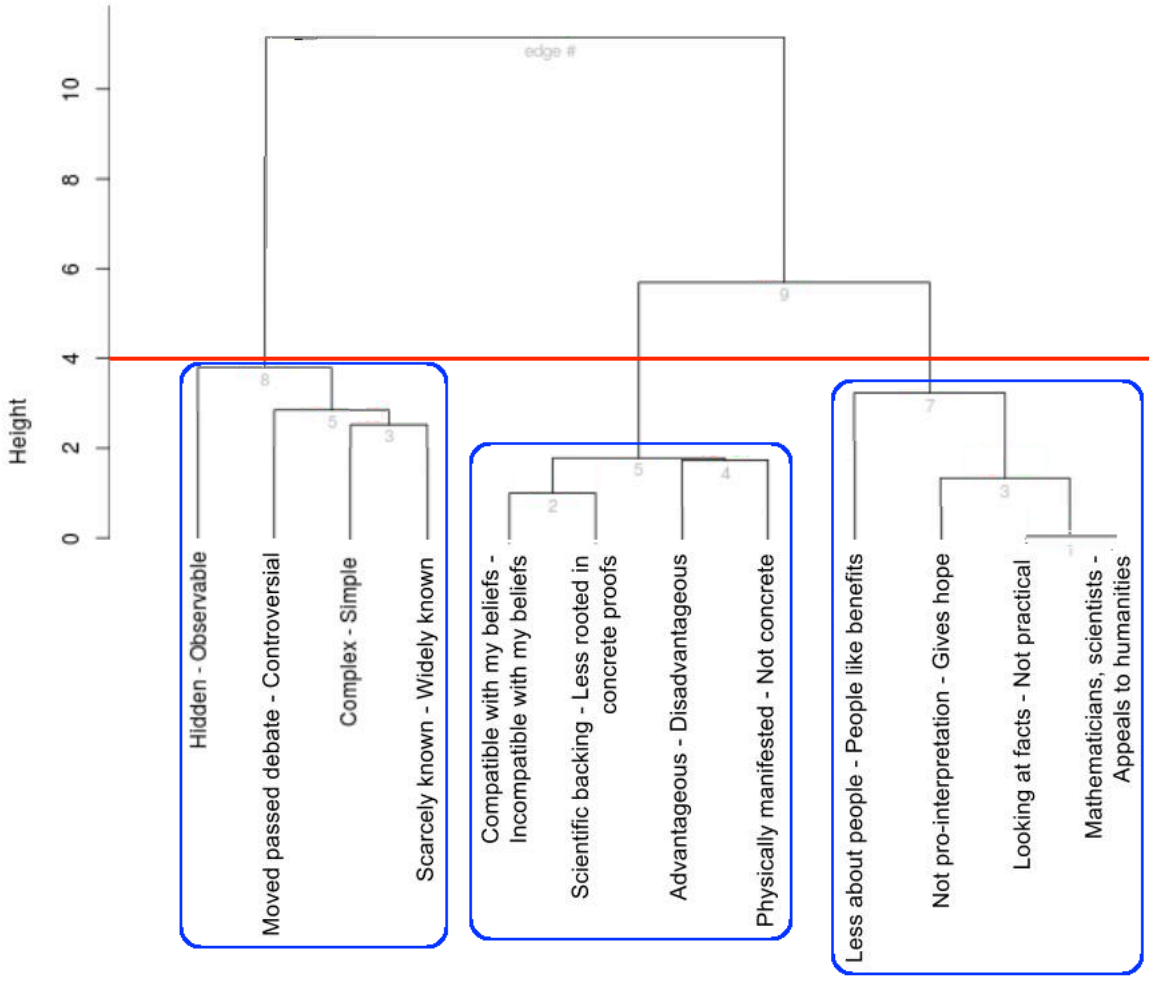
Étienne


Height
0
5
10
15
edge #
13
12
11
10
9
8
7
6
5
4
3
2
1
Widely known - Scarcely known
Not in religious texts - Religious texts
Helpful to understanding - Does not explain much
Advantageous - Disadvantageous
Role-playing games, science fiction - Not in PPG or SciFi
Incompatible with my beliefs - Compatible with my beliefs
Fictional media - Non-fiction books
Name gives the theory - Understand without name
Advertisements - Not a lot of advertisements
Hear from people we know - Do not explicitly discuss
Observable - Hidden
Not as complex - Hard to explain
Simple - Complex
Change for laypeople - No change for laypeople
Less specific to domain - Specific

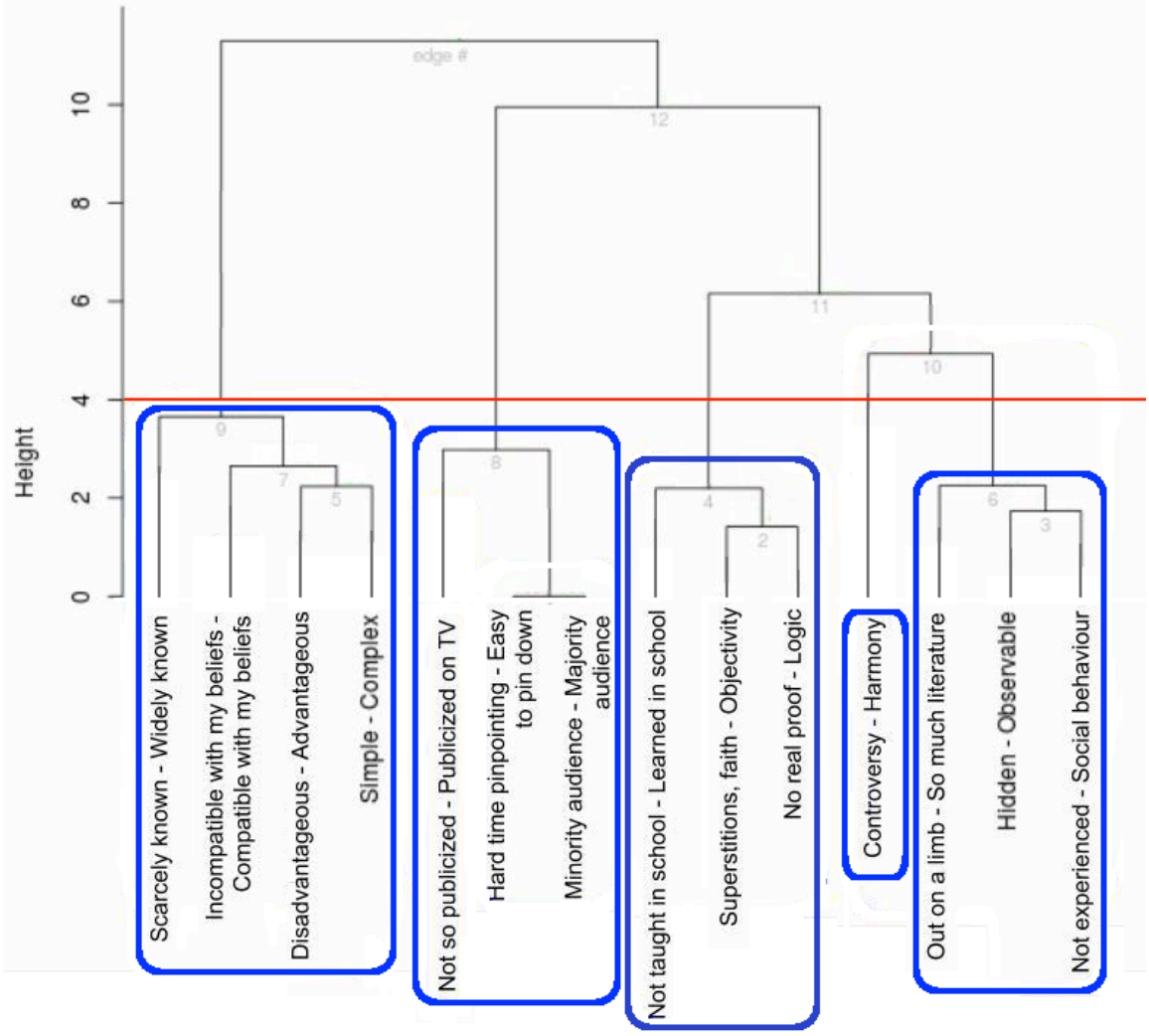
Evelina


Height
0
2
4
6
8
edge #
1
2
3
4
5
6
7
8
9
10
Multiple perspectives - Only one idea
Question beginning of existence - End of reality
Curiosity about past - No wonderment about past
Advantageous - Disadvantageous
Simple - Complex
Ideas in movie - Spontaneous wondering
Original source of idea - Popular secondary media
Existence in something real - Just idea
Widely known - Scarcely known
Like world where it's true - Interest, speculation
Observable - Hidden
Compatible with my beliefs - Incompatible with my beliefs

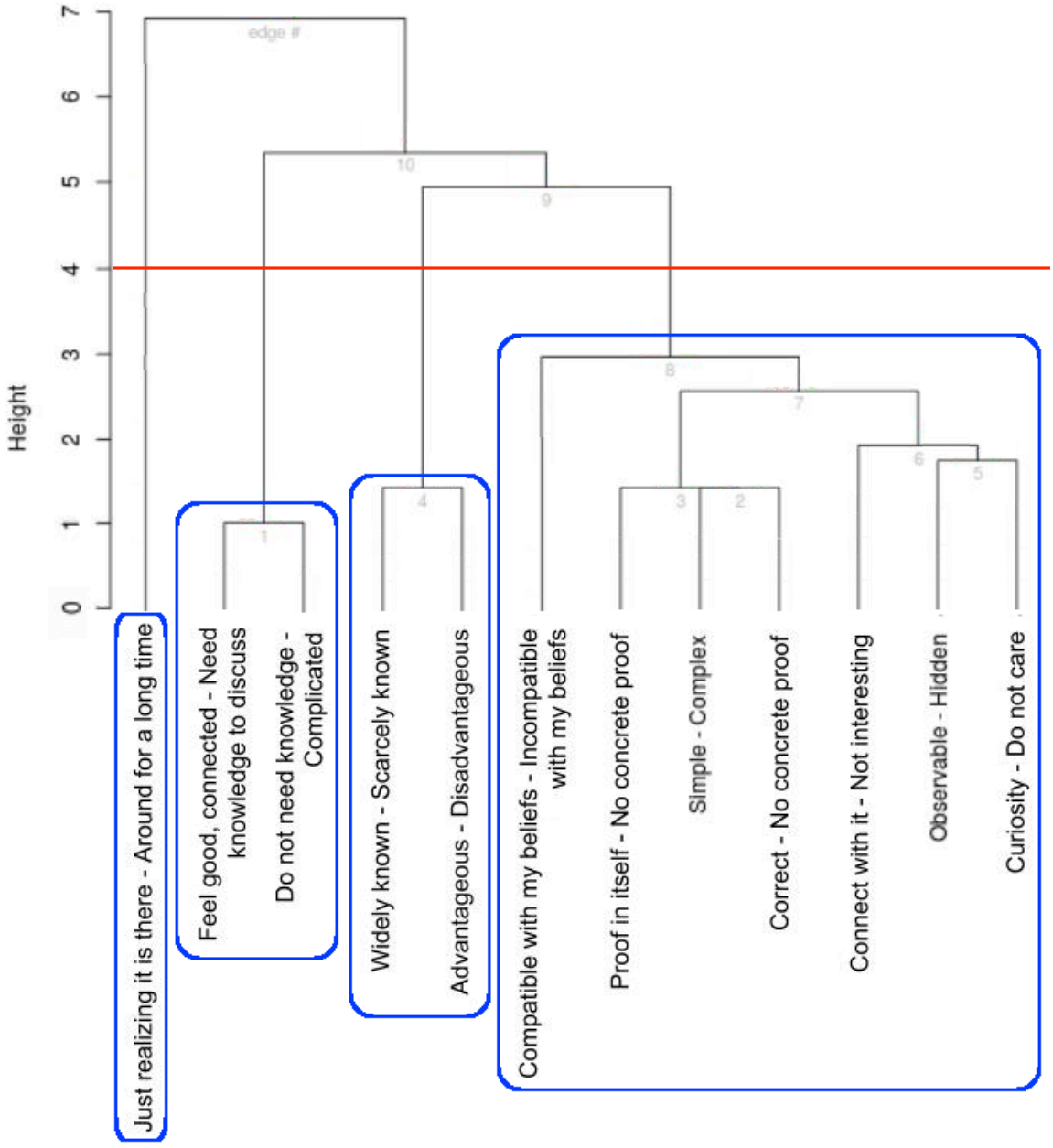
Jacob


Height
0
2
4
6
8
10
edge #
Hidden - Observable
Moved passed debate - Controversial
Complex - Simple
Scarcely known - Widely known
Compatible with my beliefs - Incompatible with my beliefs
Scientific backing - Less rooted in concrete proofs
Advantageous - Disadvantageous
Physically manifested - Not concrete
Less about people - People like benefits
Not pro-interpretation - Gives hope
Looking at facts - Not practical
Mathematicians, scientists - Appeals to humanities

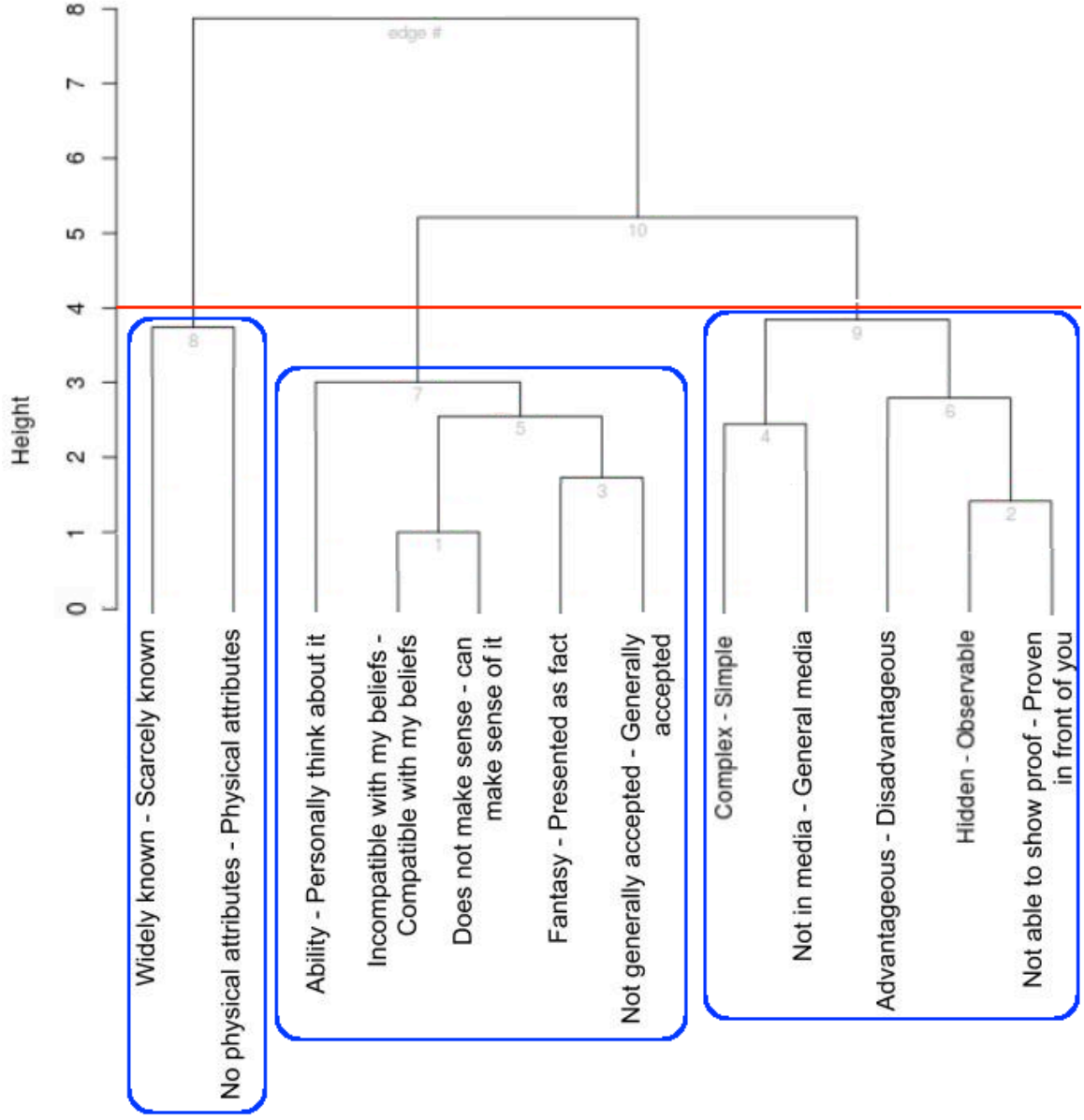
Maria


Height
0
2
4
6
8
10
edge #
12
11
10
9
8
7
6
5
4
3
2
Scarcely known - Widely known
Incompatible with my beliefs - Compatible with my beliefs
Disadvantageous - Advantageous
Simple - Complex
Not so publicized - Publicized on TV
Hard time pinpointing - Easy to pin down
Minority audience - Majority audience
Not taught in school - Learned in school
Superstitions, faith - Objectivity
No real proof - Logic
Controversy - Harmony
Out on a limb - So much literature
Hidden - Observable
Not experienced - Social behaviour

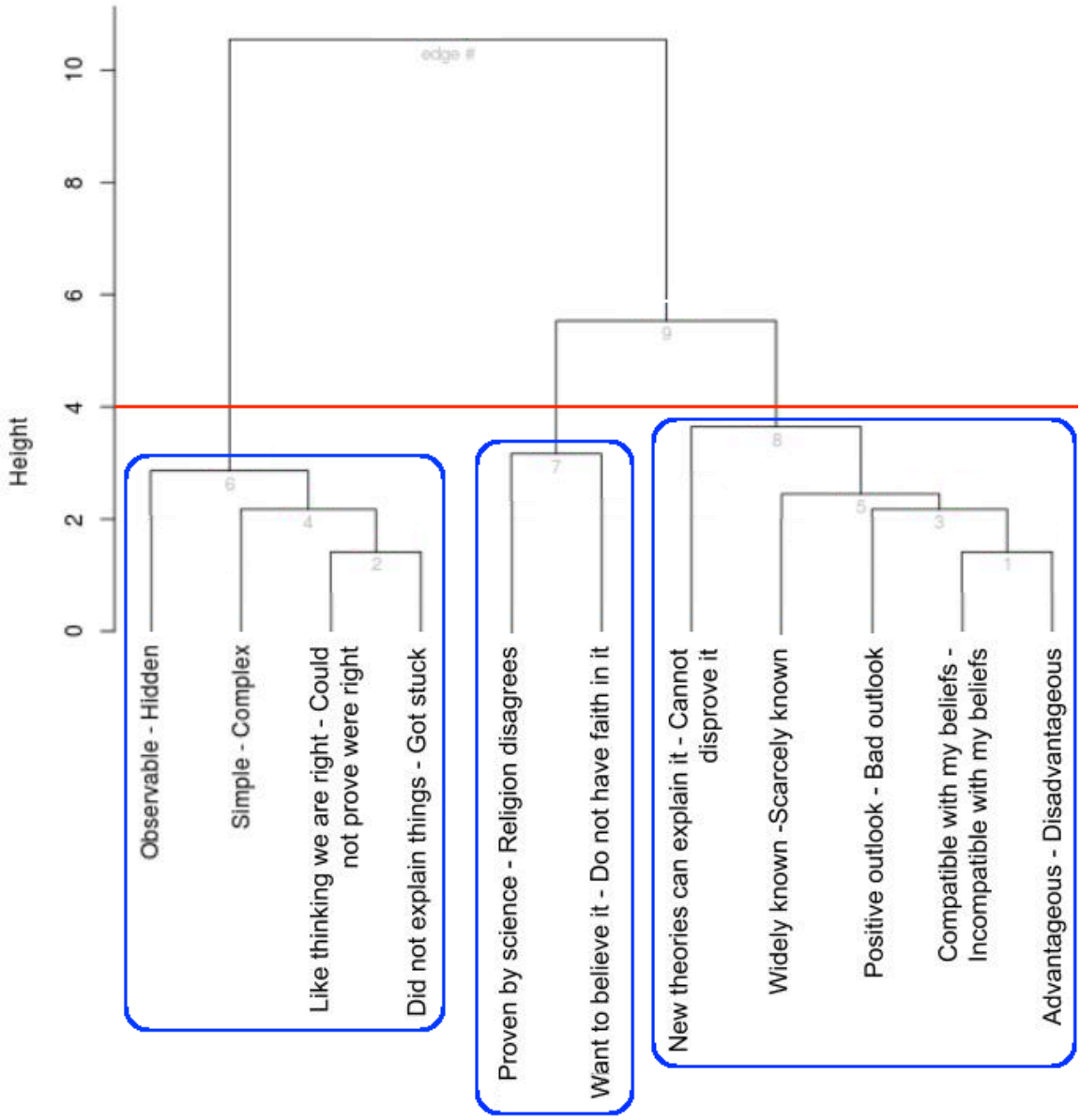
Mike


Height
0
1
2
3
4
5
6
7
edge #
10
9
8
7
6
5
4
3
2
1
Just realizing it is there - Around for a long time
Feel good, connected - Need knowledge to discuss
Do not need knowledge - Complicated
Widely known - Scarcely known
Advantageous - Disadvantageous
Compatible with my beliefs - Incompatible with my beliefs
Proof in itself - No concrete proof
Simple - Complex
Correct - No concrete proof
Connect with it - Not interesting
Observable - Hidden
Curiosity - Do not care

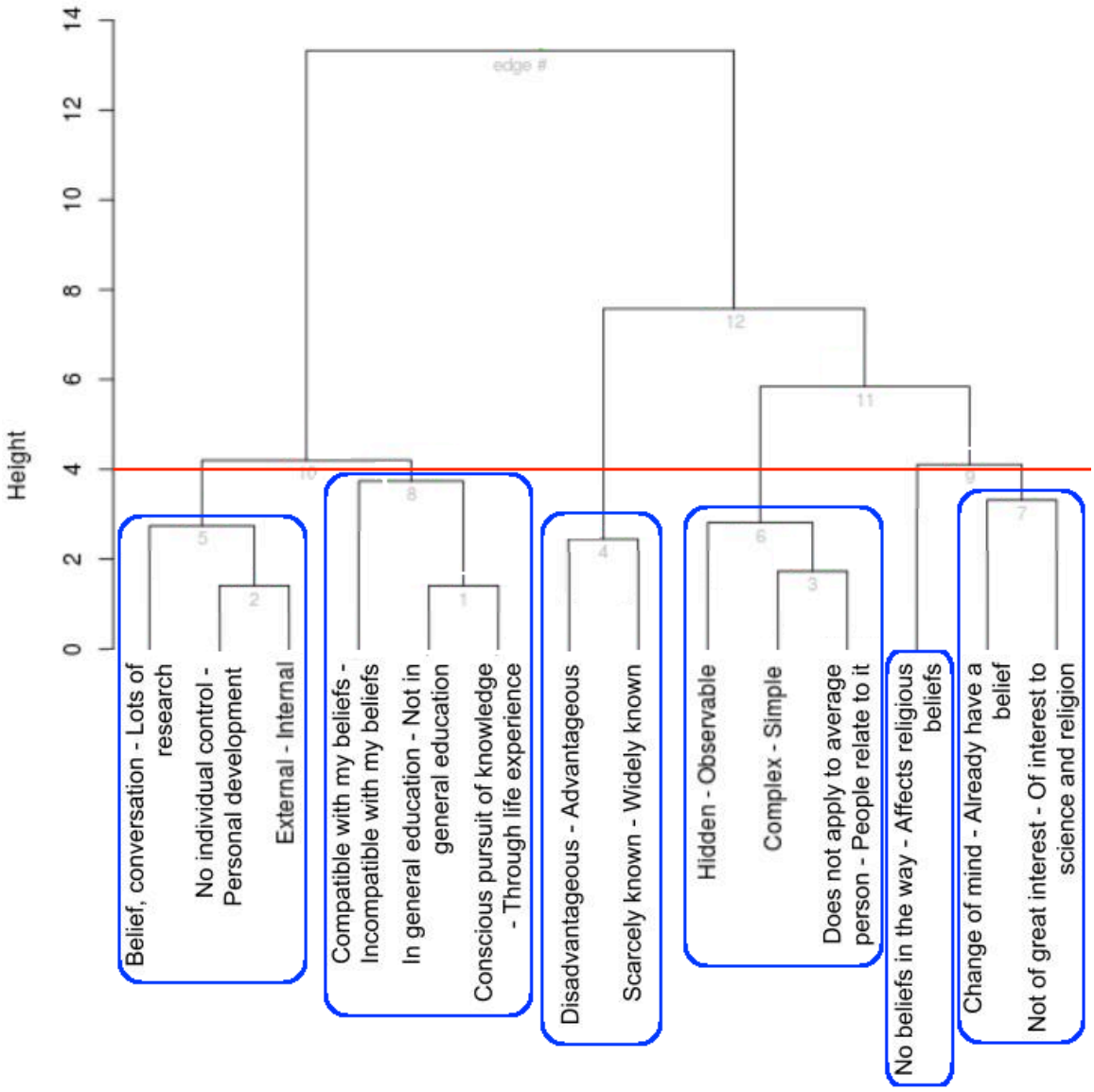
Neal


Height
0
1
2
3
4
5
6
7
8
edge #
10
8
7
5
3
1
9
6
4
2
Widely known - Scarcely known
No physical attributes - Physical attributes
Ability - Personally think about it
Incompatible with my beliefs - Compatible with my beliefs
Does not make sense - can make sense of it
Fantasy - Presented as fact
Not generally accepted - Generally accepted
Complex - Simple
Not in media - General media
Advantageous - Disadvantageous
Hidden - Observable
Not able to show proof - Proven in front of you

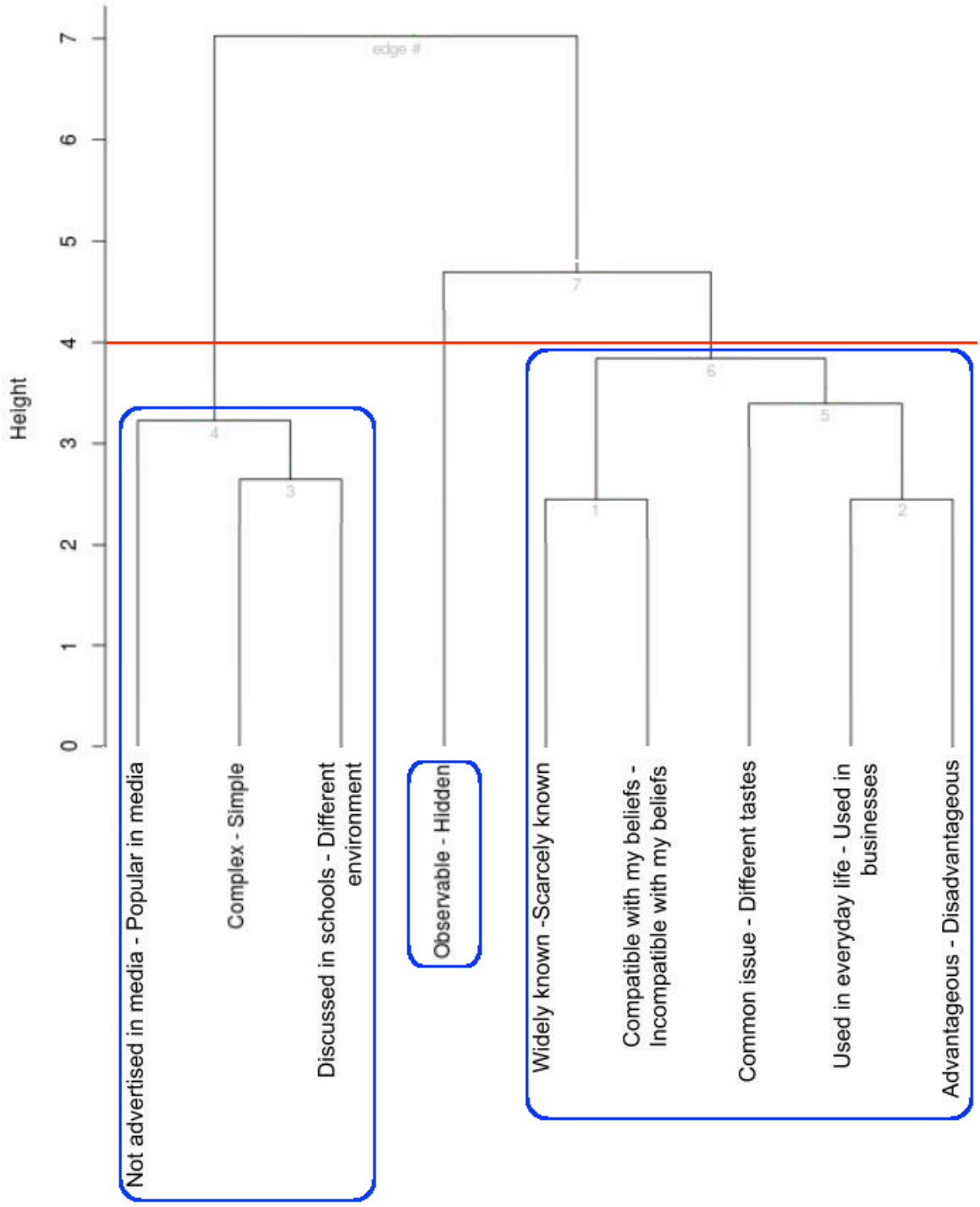
Paul

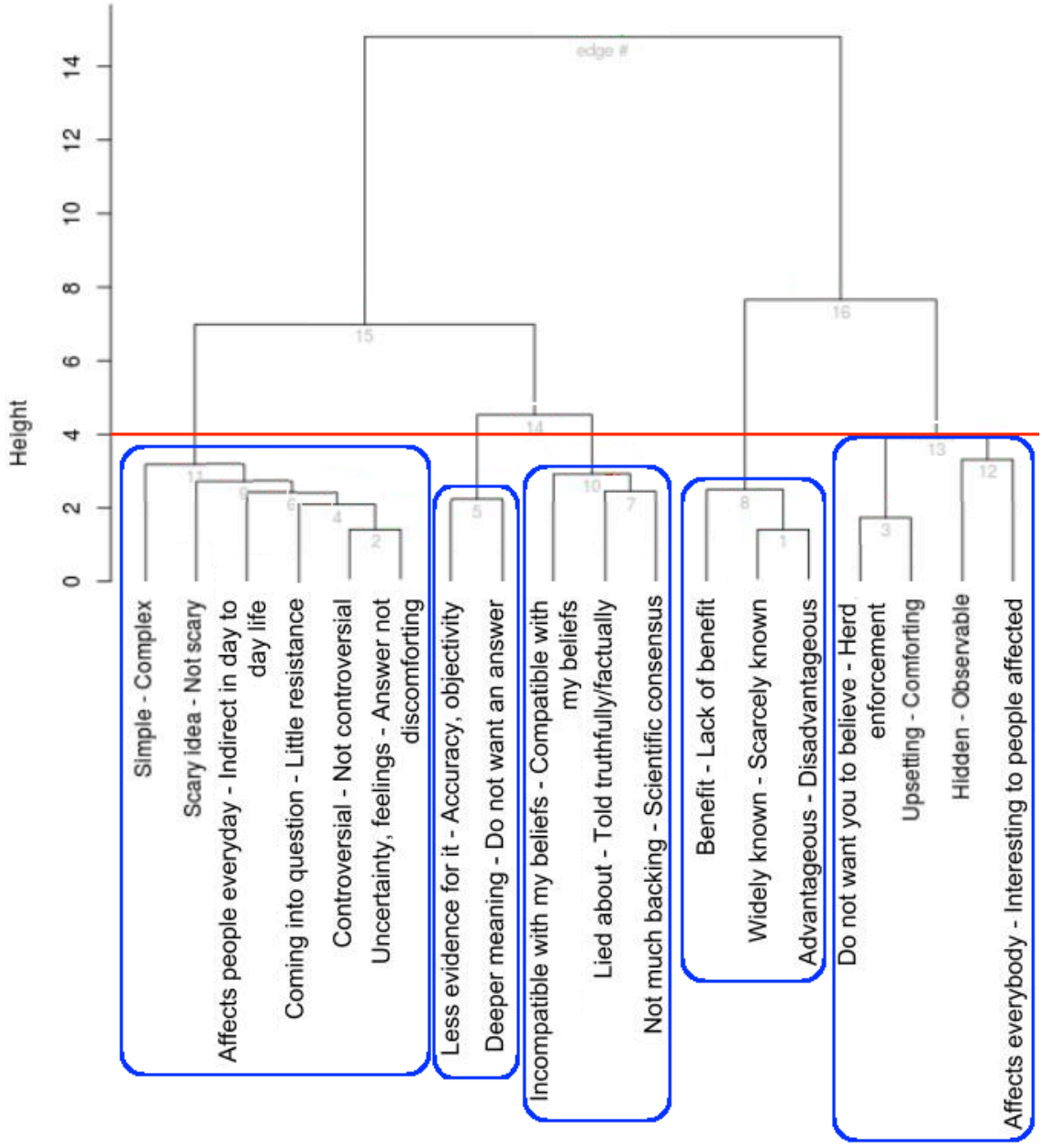

Height
0
2
4
6
8
10
edge #
9
6
4
2
7
8
5
3
1
Observable - Hidden
Simple - Complex
Like thinking we are right - Could not prove were right
Did not explain things - Got stuck
Proven by science - Religion disagrees
Want to believe it - Do not have faith in it
New theories can explain it - Cannot disprove it
Widely known -Scarcely known
Positive outlook - Bad outlook
Compatible with my beliefs - Incompatible with my beliefs
Advantageous - Disadvantageous

Reg

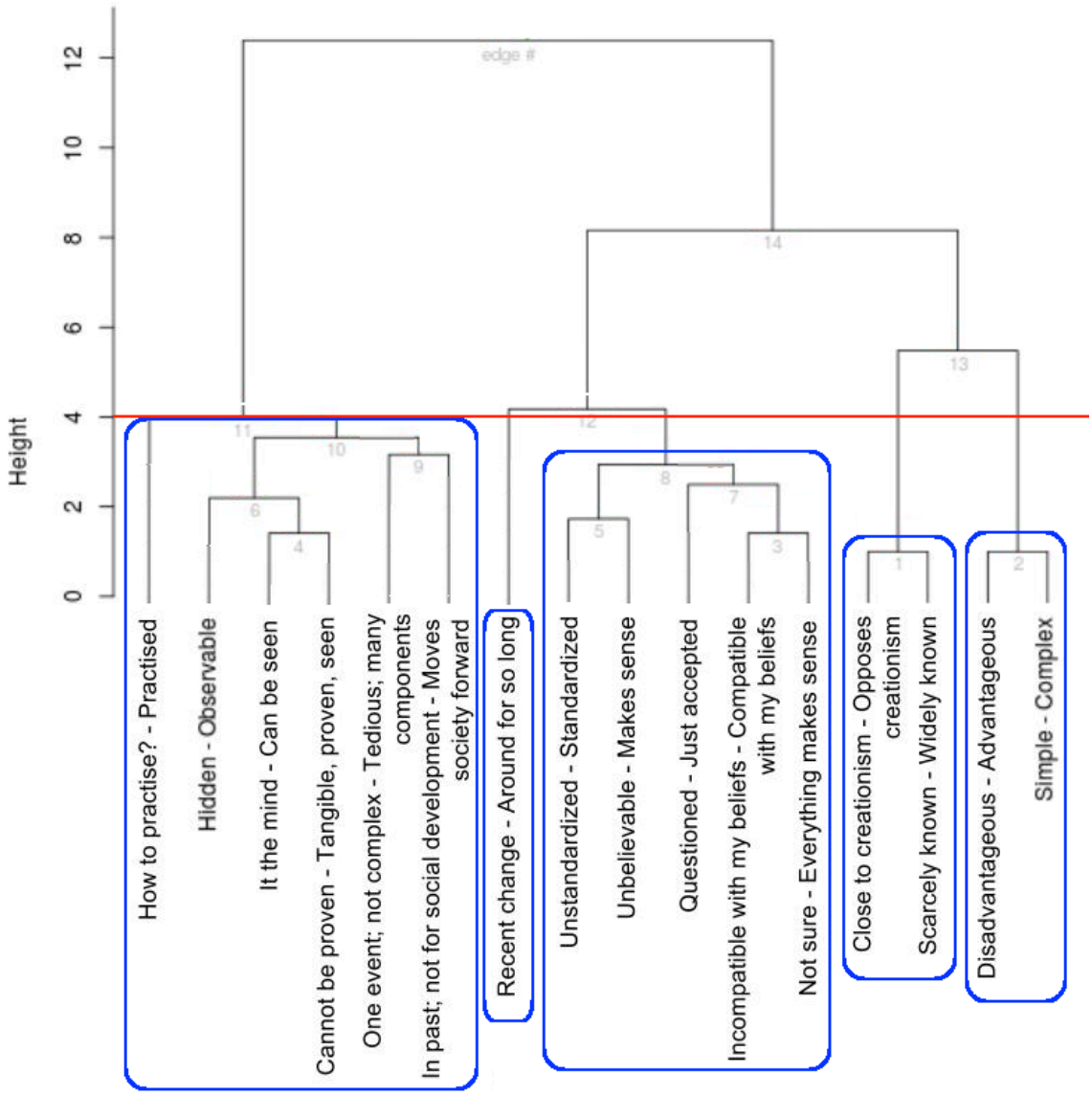

Height
0
2
4
6
8
10
12
14
edge #
Belief, conversation - Lots of research
No individual control - Personal development
External - Internal
Compatible with my beliefs - Incompatible with my beliefs
In general education - Not in general education
Conscious pursuit of knowledge - Through life experience
Disadvantageous - Advantageous
Scarcely known - Widely known
Hidden - Observable
Complex - Simple
Does not apply to average person - People relate to it
No beliefs in the way - Affects religious beliefs
Change of mind - Already have a belief
Not of great interest - Of interest to science and religion

Taryn

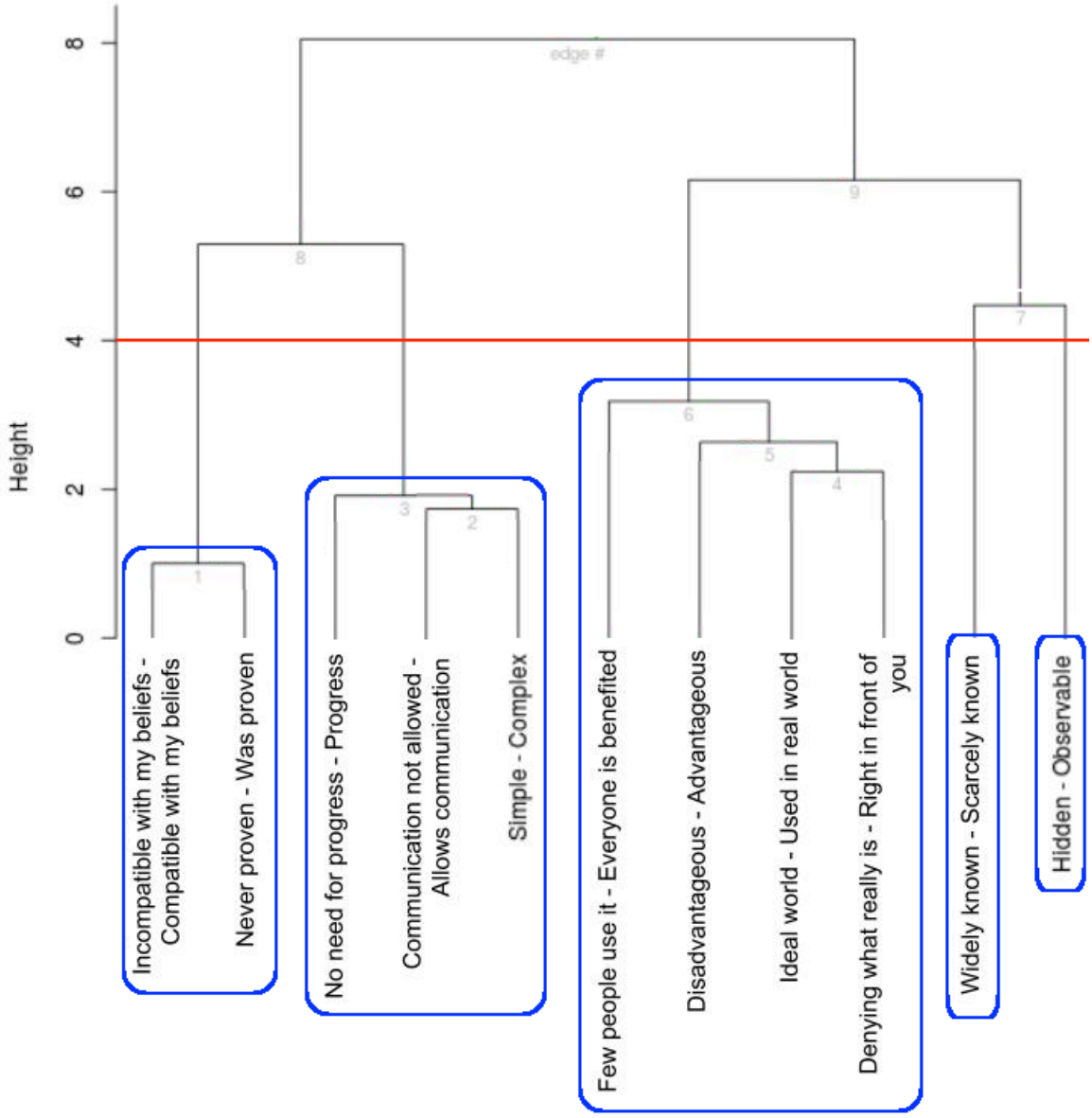

Height
0
1
2
3
4
5
6
7
edge #
4
3
7
6
5
1
2
Not advertised in media - Popular in media
Complex - Simple
Discussed in schools - Different environment
Observable - Hidden
Widely known -Scarcely known
Compatible with my beliefs - Incompatible with my beliefs
Common issue - Different tastes
Used in everyday life - Used in businesses
Advantageous - Disadvantageous


Height
0
2
4
6
8
10
12
14
edge #
15
16
14
13
12
11
10
9
8
7
6
5
4
3
2
1
Simple - Complex
Scary Idea - Not scary
Affects people everyday - Indirect in day to day life
Coming into question - Little resistance
Controversial - Not controversial
Uncertainty, feelings - Answer not discomforting
Less evidence for it - Accuracy, objectivity
Deeper meaning - Do not want an answer
Incompatible with my beliefs - Compatible with my beliefs
Lied about - Told truthfully/factually
Not much backing - Scientific consensus
Benefit - Lack of benefit
Widely known - Scarcely known
Advantageous - Disadvantageous
Do not want you to believe - Herd enforcement
Upsetting - Comforting
Hidden - Observable
Affects everybody - Interesting to people affected

T


Height
0
2
4
6
8
10
12
edge #
14
13
12
11
10
9
8
7
6
5
4
3
2
1
How to practise? - Practised
Hidden - Observable
It the mind - Can be seen
Cannot be proven - Tangible, proven, seen
One event; not complex - Tedious; many components
In past; not for social development - Moves society forward
Recent change - Around for so long
Unstandardized - Standardized
Unbelievable - Makes sense
Questioned - Just accepted
Incompatible with my beliefs - Compatible with my beliefs
Not sure - Everything makes sense
Close to creationism - Opposes creationism
Scarcely known - Widely known
Disadvantageous - Advantageous
Simple - Complex

Yakov


Height
0
2
4
6
8
edge #
1
2
3
4
5
6
7
8
9
Incompatible with my beliefs - Compatible with my beliefs
Never proven - Was proven
No need for progress - Progress
Communication not allowed - Allows communication
Simple - Complex
Few people use it - Everyone is benefited
Disadvantageous - Advantageous
Ideal world - Used in real world
Denying what really is - Right in front of you
Widely known - Scarcely known
Hidden - Observable

Appendix 7: Thematic Analysis of Construct Clusters

Participant	Cluster	Constructs	Cluster Name	Cross-Case Theme
Aaron	1	Simple – Complex	Complexity	UNDERSTANDABLE
	2	Incompatible – Compatible	Beneficial and believed	BENEFITS
		Scarcely Known – Widely Known		
		Disadvantageous – Advantageous		
		Not future-oriented – In people's interest		
	3	Observable – Hidden	Viewable records	PHYSICALLY VERIFIABLE
		Detailed records – No record		
	4	Not reassuring – Reassuring	Reassuring explanation	EXPLAINS SOMETHING MEANINGFUL
		Generates more questions – A way to explain everything		
	5	Doesn't explain who we are – Explains who we are	Answers meaningful questions	EXPLAINS SOMETHING MEANINGFUL
		Moral responsibility – Lash-back against religion		
		State of ambiguity – Not a lot of ambiguity		
Alabi	1	Predict human behaviour – Understand purpose	Greater purpose	EXPLAINS SOMETHING MEANINGFUL
	2	Influence across culture – Influence within culture	Wide controversy	NATURE OF DISCUSSION
		A lot of debate – Minimal argument		
		Media channels – Kept in academia		
	3	Observable – Hidden	Direct use	APPLIED USE
		Simple – Complex		
		Application to user – User doesn't understand		
	4	Compatible with my beliefs – Incompatible with my beliefs	Believe what's best	ALREADY ACCEPTED BEST KNOWLEDGE
		Advantageous – Disadvantageous		
	5	Understanding of purpose – Culture, behaviour	Deeper meaning	EXPLAINS SOMETHING MEANINGFUL
		Fiction – Not in fiction		
	6	Want to move away – People relate	Following	NATURE OF DISCUSSION
		Scarcely known – Widely known		
	7	No scientific evidence – Proven	Secular science	SCIENTIFIC PROOF
		Where we come from – God is not creator		
		Religious belief – Cultural prediction		

Arianna	1	Disadvantageous – Advantageous	True science	SCIENTIFIC PROOF
		Not scientifically proven – Foundation for science		
		Incompatible with my beliefs – Compatible with my beliefs		
		Secular society – Knowledge through science		
	2	Insecure belief – Comfortable, safe	Verification	PHYSICALLY VERIFIABLE
		Hidden – Observable		
		Complex – Simple		
	3	Media – Not in media	Entertainment	NATURE OF DISCUSSION
		Believers cast aside – Public figure		
		Interesting – Boring		
		Fun, entertaining – Academic, not fun		
	4	Not rooted in scientific fact – Learned in school	Evidence	SCIENTIFIC PROOF
		Not sure what to believe – Evidence as basis for belief		
	5	Widely known – Scarcely known	Suppression or Discussion	NATURE OF DISCUSSION
		Less debated to due religion – Debated		
Étienne	1	Widely known – Scarcely known	Religious popularization	RELIGIOUS BELIEF
		Not in religious texts – Religious texts		
	2	Helpful to understanding – Doesn't explain much	Explains world	EXPLAINS SOMETHING MEANINGFUL
	3	Advantageous – Disadvantageous	Beneficial abilities	BENEFITS
		Role-playing games, science fiction – Not in RPGs or SciFi		
	4	Incompatible with my beliefs – Compatible with my beliefs	Believe facts	ALREADY ACCEPTED BEST KNOWLEDGE
		Fictional media – Non-fiction books		
	5	Name gives theory – Understand without name	Implicit awareness	NATURE OF DISCUSSION
		Advertisements – Not a lot of advertisements		
		Hear from people we know – Do not explicitly discuss		
	6	Observable – Hidden	Accessibility	UNDERSTANDABLE
		Not as complex – Hard to explain		
		Simple – Complex		
		Change for laypeople – No change for laypeople		
		Less specific to domain - Specific		
Evelina	1	Multiple perspectives – Only one idea	Drive for curiosity	NATURE OF DISCUSSION
		Question beginning of existence – End of reality		
		Curiosity about past – No wonderment about past		
		Advantageous - Disadvantageous		
		Simple – Complex		

		Ideas in movie – Spontaneous wondering		
		Original source of idea – Popular secondary media		
	2	Existence in something real – Just idea	Empirical	PHYSICALLY VERIFIABLE
	3	Widely known – Scarcely known	Motivated interest	BENEFITS
		Like world where it's true – Interest, speculation		
	4	Observable – Hidden	Believe what you see	PHYSICALLY VERIFIABLE
		Compatible with my beliefs – Incompatible with my beliefs		
Jacob	1	Hidden – Observable	Open for discussion	NATURE OF DISCUSSION
		Moved passed debate – Controversial		
		Complex – Simple		
		Scarcely known – Widely known		
	2	Compatible with my beliefs – Incompatible with my beliefs	Empiricism	PHYSICALLY VERIFIABLE
		Scientific backing – Less rooted in concrete proofs		
		Advantageous – Disadvantageous		
		Physically manifested – Not concrete		
	3	Less about people – People like benefits	Human interest	EXPLAINS SOMETHING MEANINGFUL
		Not pro-interpretation – Gives hope		
		Looking at facts – Not practical		
		Mathematics, scientists – Appeals to humanities		
Maria	1	Scarcely known – Widely known	Know what is best	ALREADY ACCEPTED BEST KNOWLEDGE
		Incompatible with my beliefs – Compatible with my beliefs		
		Disadvantageous – Advantageous		
		Simple - Complex		
	2	Not so publicized – Publicized on TV	Publicize	NATURE OF DISCUSSION
		Hard time pinpointing – Easy to pin down		
		Minority audience – Majority audience		
	3	Not taught in school – Learned in school	Positivist education	ALREADY ACCEPTED BEST KNOWLEDGE
		Superstitions, faith – Objectivity		
		No real proof - Logic		
	4	Controversy – Harmony	Debate	NATURE OF DISCUSSION
	5	Out on a limb – So much literature	Can experience	PHYSICALLY VERIFIABLE
		Hidden – Observable		
		Not experienced – Social behaviour		
Mike	1	Just realizing it's there – Around for a long time	Age	ALREADY ACCEPTED BEST KNOWLEDGE
	2	Feel good, connected – Need knowledge to discuss	Pre-requisite knowledge	UNDERSTANDABLE

		Don’t need knowledge – Complicated		
	3	Widely known – Scarcely known	Know what’s good	ALREADY ACCEPTED BEST KNOWLEDGE
		Advantageous - Disadvantageous		
	4	Compatible with my beliefs – Incompatible with my beliefs	Relatable truth	UNDERSTANDABLE
		Proof in itself – No concrete proof		
		Simple – Complex		
		Correct – No concrete proof		
		Connect with it – Not interesting		
		Observable – Hidden		
		Curiosity – Don’t care		
Neal	1	Widely known – Scarcely known	Know the physical	PHYSICALLY VERIFIABLE
		No physical attributes – Physical attributes		
	2	Ability – Personally think about it	Understandable truth	UNDERSTANDABLE
		Incompatible with my beliefs – Compatible with my beliefs		
		Does not make sense – Can make sense of it		
		Fantasy – Presented as fact		
		Not generally accepted – Generally accepted		
	3	Complex – Simple	Obviousness	PHYSICALLY VERIFIABLE
		Not in media – General media		
		Advantageous – Disadvantageous		
		Hidden – Observable		
		Not able to show proof – Proven in front of you		
Paul	1	Observable – Hidden	Provable explanation	SCIENTIFIC PROOF
		Simple – Complex		
		Like thinking we’re right – Couldn’t prove		
		Didn’t explain things – Got stuck		
	2	Proven by science – Religion disagrees	Belief	RELIGIOUS BELIEF
		Want to believe it – Don’t have faith in it		
	3	New theories can explain it – Can’t disprove it	Beneficial explanation	BENEFITS
		Widely known – Scarcely known		
		Positive outlook – Bad outlook		
		Compatible with my beliefs – Incompatible with my beliefs		
		Advantageous - Disadvantageous		
Reg	1	Belief, conversation – Lots of research	Personal scope	EXPLAINS SOMETHING MEANINGFUL
		No individual control – Personal development		
		External – Internal		
	2	Compatible with my beliefs – Incompatible with my beliefs	Structured knowledge	ALREADY ACCEPTED BEST KNOWLEDGE
		In general education – Not in general education		

		Conscious pursuit of knowledge – Through life experience		
	3	Disadvantageous – Advantageous	Know what's good	ALREADY ACCEPTED BEST KNOWLEDGE
		Scarcely known – Widely known		
	4	Hidden – Observable	Clear relatability	UNDERSTANDABLE
		Complex – Simple		
		Doesn't apply to average person – People relate to it		
	5	No beliefs in the way – Affects religious beliefs	Religion	RELIGIOUS BELIEFS
	6	Change of mind – Already have a belief	Beliefs	RELIGIOUS BELIEFS
		Not of great interest – Of interest to science and religion		
Taryn	1	Not advertised in media – Popular in media	Source of knowledge	NATURE OF DISCUSSION
		Complex – Simple		
		Discussed in schools – Different environment		
	2	Observable – Hidden	Observability	PHYSICALLY VERIFIABLE
	3	Widely known – Scarcely known	Solution	BENEFITS
		Compatible with my beliefs – Incompatible with my beliefs		
		Common issue – Different tastes		
		Used in everyday life – Used in businesses		
		Advantageous - Disadvantageous		
Trennick	1	Simple – Complex	Affective motivation	BENEFITS
		Scary idea – Not scary		
		Affects people everyday – Indirect in day to day life		
		Coming into question – Little resistance		
		Controversial – Not controversial		
		Uncertainty, feelings – Answer not discomforting		
	2	Less evidence for it – Accuracy, objectivity	Hard truths	SCIENTIFIC PROOF
		Deeper meaning – Do not want an answer		
	3	Incompatible with my beliefs – Compatible with my beliefs	Scientific truth	SCIENTIFIC PROOF
		Lied about – Told truthfully/factually		
		Not much backing – Scientific consensus		
	4	Benefit – Lack of benefit	Know what's beneficial	ALREADY ACCEPTED BEST KNOWLEDGE
		Widely known – Scarcely known		
		Advantageous - Disadvantageous		
	5	Do not want you to believe – Herd enforcement	Social pressure	ALREADY ACCEPTED BEST KNOWLEDGE
		Upsetting – Comforting		
		Hidden – Observable		
		Affects everybody – Interesting to people		

		affected		
⊢	1	How to practise? – Practised	Manifest to progress	APPLIED USE
		Hidden – Observable		
		In the mind – Can be seen		
		Cannot be proven – Tangible, proven, seen		
		One event; not complex – Tedious; many components		
		In past; not for social development – Moves society forward		
	2	Recent change – Around for so long	Age	ALREADY ACCEPTED BEST KNOWLEDGE
	3	Unstandardized – Standardized	Well-established	ALREADY ACCEPTED BEST KNOWLEDGE
		Unbelievable – Makes sense		
		Questioned – Just accepted		
		Incompatible with my beliefs – Compatible with my beliefs		
		Not sure – Everything makes sense		
	4	Close to creationism – Opposes creationism	Religious controversy	RELIGIOUS BELIEF
		Scarcely known – Widely known		
	5	Disadvantageous – Advantageous	More than simple explanations	EXPLAINS SOMETHING MEANINGFUL
		Simple – Complex		
Yakov	1	Incompatible with my beliefs – Compatible with my beliefs	Believe truth	ALREADY ACCEPTED BEST KNOWLEDGE
		Never proven – Was proven		
	2	No need for progress – Progress	Technology	APPLIED USE
		Communication not allowed – Allows communication		
		Simple - Complex		
	3	Few people use it – Everyone benefitted	Real benefits	BENEFITS
		Disadvantageous – Advantageous		
		Ideal world – Used in real world		
		Deny what really is – Right in front of you		
	4	Widely known – Scarcely known	Initial Diffusion	ALREADY ACCEPTED BEST KNOWLEDGE
	5	Hidden - Observable	Observability	PHYSICALLY VERIFIABLE

Appendix 8: Coding Framework

Category	Code	Definition
Descriptive – Education Level		
Edu: High School	ED-HS	Description of formal educational background includes, but does not go beyond high school or secondary school studies
Edu: College and Trades	ED-COL	Description of formal educational background predominantly includes attendance at a college-style institution, including CEGEP
Edu: University	ED-UNI	Description of formal educational background predominantly includes attendance at a university institution at the undergraduate level, without completion of postgraduate studies
Descriptive – Academic Background		
Edu: Sciences	ED-SCI	Description of area of study or subject of interest falls within the sciences
Edu: Social Sciences	ED-SOC	Description of area of study or subject of interest falls within the social sciences
Edu: Humanities	ED-HUM	Description of area of study or subject of interest falls within the humanities
Edu: Other	ED-OTH	Description of area of study or subject of interest does not fall into any of the academic domains above
Descriptive – Profession		
Prof: Sciences	PROF-SCI	Description of profession falls within the sciences
Prof: Social Sciences	PROF-SOC	Description of profession falls within the social sciences
Prof: Humanities	PROF-HUM	Description of profession falls within the humanities
Prof: Other	PROF-OTH	Description of profession does not specifically fall into any of the academic domains above
Deductive – Innovation Characteristics		
Innovation: Relative Advantage	INN-ADV	Description of a theory by participant refers to the perceived advantage over earlier or other related theories
Innovation: Compatibility	INN-BEL	Characterization of a theory by participant refers to the consistency of the theory with existing personal or societal values, beliefs, norms or needs, or with their current needs or practices
Innovation: Complexity	INN-CMP	Description of a theory by participant refers to a difficulty in understanding or application
Innovation: Observability	INN-OBS	Description of a theory by participant refers to the visibility of knowledge, acceptance, or results

Innovation: Triability	INN-TRI	Description of a theory by participant refers to the ability to personally experiment, question, or test theory before making a decision of whether to adopt it
Innovation: Image	INN-IMG	Description of a theory by participant refers to the contribution to social image or status
Innovation: Voluntariness	INN-VOL	Description of a theory by participant refers to a degree of free will or voluntary uptake, or in comparison to forced or mandated uptake
Innovation: Cost	INN-CST	Description of a theory by participant refers to the resources (money or time) required
Innovation: Communicability	INN-COM	Description of a theory by participant refers to the degree with which it can be communicated to others
Innovation: Divisibility	INN-DIV	Description of a theory by participant refers to experimenting, questioning, or testing the theory on an initially small scale
Innovation: Profitability	INN-PROF	Description of a theory by participant refers to the resources (money or time) gained
Innovation: Social approval	INN-SOC	Description of a theory by participant refers improvement in social status, within their social group
Deductive – Innovation Diffusion Context		
Context: Communication Channels	CON-COM	Description or explanation of theory popularity by participant refers to the channels through which information about the theory is communicated
Context: Adopter Characteristics	CON-ADPT	Description or explanation of theory popularity by participant refers to a particular characteristic of the participant, or other adopters of the theory
Context: Diffusion Process	CON-PROC	Description or explanation of theory popularity by participant refers to a particular stage in diffusion, from initial awareness to continued implementation
Context: Social System	CON-SOC	Description or explanation of theory popularity by participant refers to an element of the societal context in which the theory was produced, communicated, or implemented, such as social norms/beliefs/values, political climate, social groups, geography or culture
Context: Diffusion	CON-POP	Description or explanation by participant of the meaning of ‘popularity’ or ‘diffusion’ in relation to academic theories
Deductive – Academic Context		
Academic: Theory	ACA-THE	An interpretation of the meaning of ‘theory’ by participant
Academic: Domain	ACA-DOM	Description of theory popularity by participant refers to one or more of the three academic domains – physical sciences, social sciences, or humanities