

Sticky technologies: Plumpy'nut®, emergency feeding, and the viscosity of humanitarian design

Tom Scott-Smith

Department of International Development, University of Oxford

Abstract

Inspired by de Laet and Mol's classic article on the Zimbabwean Bush Pump and Peter Redfield's revival of fluidity as a central characteristic of humanitarian design, this paper argues that many humanitarian technologies are characterized not so much by fluidity as by stickiness. Sticky technologies lie somewhere between fluid technologies and Latourian immutable mobiles: They work precisely because they are mobile and not overly adaptable, yet they retain some flexibility by reaching out to shape and be shaped by their users. The concept is introduced through a detailed study of Plumpy'nut®, a peanut paste for therapeutic feeding that is materially sticky – much firmer than a fluid, yet still mutable – as well as conceptually sticky. 'Stickiness' can have wide utility for thinking through technology and humanitarianism.

Keywords

nutrition, humanitarianism, design, development, fluidity

Correspondence

Tom Scott-Smith, Department of International Development, University of Oxford,
3 Mansfield Road, OX1 3TB, UK.

Email: tom.scott-smith@qeh.ox.ac.uk

Introduction

It is easy to love fluidity. Fluid movement implies grace and effortless beauty. Fluid materials yield and flow. Fluids fill gaps, change in response to new conditions and are inherently smooth and adaptable. These qualities have been particularly welcome in development and humanitarian aid.

The Zimbabwe bush pump, as described in an article by de Laet and Mol (2000), is perhaps the best-known fluid technology with a clearly benevolent aim. It was fluid in its ownership: created by a modest designer and part of the public domain. It was fluid in its form: shaped, moulded, and adapted to local needs. It was fluid in results: able to be renewed with improvised components that sometimes succeeded and sometimes did not. It was also fluid in its boundaries, ontologically fluid. It could be defined as a mechanical water-producing device, a type of hydraulics, a sanitation-promoter, and a nation-building apparatus. De Laet and Mol argued that fluidity was key to the object's success: The bush pump reached out through porous boundaries and created relationships, forming alliances with users and inspiring love in its critical academic biographers.

In a more recent article in this journal, Redfield (2016) revisits the notion of fluidity and its connection with humanitarian design. He compares the Zimbabwe bush pump with a more recent technology for providing clean water: the LifeStraw®. Whereas the bush pump is immobile, the LifeStraw® is portable. Whereas the bush pump is part of the public domain, the LifeStraw® is trademarked. Whereas the bush pump supplies water from a stable point on the ground, the LifeStraw® purifies already existing water sources. But the two tools operate in a similar domain, doing good by making clean water available to people in need. In exploring the contrasts and tensions, Redfield draws attention to the fundamental mobility of the LifeStraw®. To use his delightful phrase, this makes it 'nomadic rather than agrarian' (Redfield, 2016: 8). He then examines fluidity as a central characteristic of a whole generation of objects with an explicit humanitarian purpose, describing them as 'fluid technologies', which are involved in providing basic services – such as electricity, water, food, and sanitation – off the grid (2016: 15). In Redfield's sense, fluid technologies are mobile rather than static, they work with the market rather than against it, and they embody a vision of individual survival rather than nation building. In these ways, fluid technologies

reflect our contemporary condition: a world not so much concerned with the formation of post-colonial states as with the need for flexibility in the context of neoliberal globalization.

Taken together, the two papers – by de Laet and Mol and by Redfield – have become rich and provocative sources for thinking about design and contemporary humanitarianism. They provide a rare but welcome combination of science studies and development studies, and they help to explain what makes fluidity such an important part of practical attempts to relieve human suffering. My aim in this article, however, is to introduce a related concept, stickiness – along with its important component, viscosity. This reminds us that fluids are not always smooth and adaptable, but can also be inflexible, stiff and resistant to change. Water is a fluid, and it flows around things easily, but other fluids are thicker: Honey flows more slowly, treacle is thicker still and some liquids barely trickle at all. This continuum of consistencies, I will argue, is particularly useful for understanding humanitarian technologies, which have a tendency to be both fluid and firm, open and controlling. Stickiness also raises wider questions about fluidity as a concept, drawing attention to the range of textures embraced in other technologies as well.

This paper begins in conceptual terrain. To clarify the notion of stickiness, I start by contrasting fluid technologies with those that have the opposite characteristics: immutable technologies that are also fixed, unchanging and controlling. After establishing this contrast and providing an illustration, I then develop the idea that most humanitarian technologies fall somewhere in between. The characteristics of these ‘sticky technologies’ can be illustrated through a detailed study of Plumpy’nut®, the ‘Ready to Use Therapeutic Food’ for severe malnutrition, which is archetypally ‘sticky’ in three main respects: it is sticky in form, sticky in ownership, and sticky in use. The final section then argues that stickiness has wider applicability in STS, not just by illuminating the complex dynamics of humanitarian technologies, but also by reminding us how fluidity, more generally, is a matter of degrees.

Humanitarianism and development: Fluidity and immutability

Humanitarianism, in its classical sense, is primarily characterized by urgency. It refers to short-term relief; its central aim is to save lives by providing food, shelter, clean water, and medical care. The dynamics of an organization like Médecins Sans Frontières (MSF) is a good illustration of the humanitarian sector, because the organization prides itself on rapid mobilization and a universal remit (Redfield, 2005, 2006, 2013). It prioritizes speed and impartiality, responding to the greatest need wherever it may be found. In this context, fluidity can be invaluable. Fluid technologies are light, flexible, quick to deploy and become crucial in emergencies. As Redfield (2012, 2016) points out, the Lifestraw® is just one of a growing range of micro-technologies that provide basic needs in the absence of large, state-led infrastructures: objects that provide a quick and efficient path to food, water, shelter and healthcare when other services are absent or have broken down (see also Cross and Street, 2009; Duffield, 2012; Elyachar, 2012; Scott-Smith, 2016).

Whereas humanitarianism prioritizes the provision of short-term relief to meet basic needs, development refers to long-term socio-political change. This is a distinction that becomes particularly useful when contrasting the Lifestraw® and the bush pump. After all, both objects may be fluid, but they are fluid in different ways. The Lifestraw® is fluid in a humanitarian sense, reflecting the political imaginary of our present moment and oriented around urgency and short-term action. The bush pump, however, is fluid within the terms of a classical development intervention: more concerned with long-term social and political change. Indeed, the bush pump makes for a poor humanitarian technology because it is so immobile, long-term and ‘agrarian’. It can never be quickly deployed because it is so large and cumbersome; it can never have a global reach because it is so intrinsically Zimbabwean; it can never be humanitarian because it has long-term aspirations. Yet it is still fluid. As de

Laet and Mol originally pointed out, the bush pump helps to create community and facilitate long-term improvements in welfare. It is open and flexible, and can be adapted to the local context. In other words, it ‘tries to serve’ – not by imposing itself on radically different environments, but by remaining responsive to new conditions (de Laet and Mol, 2000: 252-3).

Fluidity is useful in many domains and it can help make sense of technologies in both humanitarian and developmental forms of intervention. Yet there are a great many other objects – particularly in humanitarian relief – that are, in fact, not fluid at all. These are top-down and controlling. They are clearly bounded and well defined. In many ways, they resemble immutable mobiles (Latour, 1990), in that they are designed to retain their shape as they are transported from one radically different environment to another, but they often slip beneath our analytical radar. This is partly because fluidity – told through the archetype of the bush pump – has become one of the few concepts in Science and Technology Studies with real purchase in the study of development and humanitarian aid (Redfield, 2016: 2). But it is also because these older, fixed and unchanging technologies rarely appear in the media coverage of humanitarianism. This coverage tends to focus on flexible and ‘innovative’ modern designs, whilst neglecting how scarce and impractical they often are in the field.

A good example of the older, but more common, approach is Corn-Soy Blend, or CSB. This is a supplementary food made by blending corn meal and soy flour with micronutrient powder, and then mixing with oil and sugar on site.¹ As I have argued elsewhere (Scott-Smith 2015a, 2015b), CSB is a product of high modernist order and state-centric control: From the mid-20th Century, donor nations shaped it in their interests, determining the constituent commodities and preventing individual ingredients from being cooked and eaten separately. It is also a highly inflexible technology. Recipients of CSB cannot use the corn, soya, oil, sugar and other ingredients how they wish. They cannot, for

example, use the sugar to make sweets during Ramadan, or separate the corn meal from the soya to make different dishes. The individual commodities have been blended in stable proportions to ensure they must be consumed together. The very *form* of the blend, in other words, prevents ‘improper’ uses.

The same dynamic can be found in the instructions that accompany the product. Before distribution, potential recipients of CSB have to attend a ‘cooking demonstration’, where they are taught how to cook the porridge using the correct balance of flour and water. They are told who in the family is meant to receive different blends and how many times a day. They are sat down in lines and made to learn how to cook the food ‘properly’ while repeating the key messages in unison. The packet is then distributed with helpful symbols and images as part of a system that is designed to ensure that nutritionists can control the passage of nutrients into the bodies of the people who need them. This takes basic decisions about how to use ingredients – how to cook them, who to feed with them, how to serve them – out of recipients’ hands.

CSB thus lacks the fluidity of the Lifestraw® or bush pump. It is not adaptable, it cannot be changed, and it has been designed to bind users to a particular path of action. CSB is an edible immutable mobile: It can travel to hungry people and yet still holds its shape; it has been defined to meet nutritional needs but it cannot be easily adapted. It also curtails and restricts behaviour, with its accompanying cooking demonstrations that ‘configure the user’ (Woolgar, 1991), and its instructions that create a ‘script’ to shape behaviour (Akrich, 1992). CSB is not fluid, but is controlled and paternalistic, and in this respect it resembles humanitarianism itself. Paternalism is central to humanitarianism because the circumstances of disaster demand control, acting on people without their involvement (Barnett, 2011: 12-13, 34-37). Humanitarian situations, in other words, call for objects that are stiffer, more inflexible, those that constrain users rather than smoothly adapting to their demands.²

Many other humanitarian technologies have similar characteristics. Refugee camps, for example, have a strict, linear layout, featuring barriers to contain people and using ‘by-laws’ to restrict behaviour (Agier, 2011; Birkeland et al., 2004: 201; Harvey et al., 2002: 297; Turner, 2005). Biometric registration systems prevent manipulation, inserting individuals into pre-set categories and distributing aid through fixed household units (Jacobsen, 2015: 57-87). Tents and shelters are designed as universal solutions for displaced people, limiting ways of life (Harrell-Bond, 1986; Hyndman, 2000; Malkki, 1996). These carefully circumscribed technologies do not encapsulate twenty-first century conditions of flexibility and fluidity so neatly: they recall, instead, a world of mid-twentieth century modernist order and bureaucratic control. Yet they remain extremely common in emergencies.

Fluidity, as a concept, was developed to complicate this Latourian account of immutable mobiles, stable networks and powerful inventors. De Laet and Mol (2000) showed how fluid technologies like the bush pump could succeed by being open, flexible, and adaptable. The bush pump, they pointed out, did not hold its shape, did not control its users, but still worked elegantly. In the rest of this article, I add nuance to this picture by showing how many technologies exist in a middle ground. They might be immutable and controlling in some respects, but they are open to adaptation as well. They combine fluid and immutable characteristics, which is particularly important in emergencies. In these, volatile situations, too much fluidity can be dangerous (Beisel and Schneider, 2012). Stickiness, therefore, introduces friction, preventing too much fluidity in rapidly changing circumstances.

Stickiness, as a concept, also reminds us that fluidity can come in degrees. It is related to viscosity – a more precise term that refers to a measurement of internal friction – but has a more visceral quality. Stickiness describes a consistency and the quality of adhering to other things. Viscosity, however, has a slightly different meaning, referring to a fluid’s resistance to flow, the extent to which deformation is possible. Viscous fluids are nearly always sticky –

although there are some rare exceptions such as mercury, which is viscous but not sticky – but the term has the advantage of drawing our attention to a whole range of consistencies. These extend from the most viscous materials such as resin or pitch, which are often indistinguishable from a solid, to the least viscous material such as a superfluid, which will move with virtually no friction. Introducing stickiness and viscosity into our theoretical vocabulary, therefore, helps to demonstrate how fluid technologies come in a range of forms, from those that are expansive, frictionless and mobile (but also unstable and unsettled), to those that are firm, constrained, and bounded (but also paternalistic and inflexible).

Plumpy’nut® in form

When I first held a sachet of Plumpy’nut® it reminded me of freeze-dried ice cream for astronauts, a novelty product from my youth. It comes wrapped in the same thick foil, and it has the same satisfying bulk and firmness beneath the silvery exterior. Each sachet weighs 92g, it is 12cm long, 6cm in width, 1cm deep, and filled with thick peanut paste. Slipped in the pocket, it is portable but powerful, containing 500 kilocalories, which is a great deal of energy for the weight. The wrapper lists the ingredients and some instructions on how to use it, set out in a three-step consumption procedure: ‘knead the sachet’, ‘tear and open’, then ‘squeeze and eat’. As with all packets, this is easier said than done. Plumpy’nut® has been ‘packaged under protective atmosphere’ and its ‘sachets are air and humidity tight’: this gives it a long shelf life but makes it difficult to open. Once a corner has been ripped off, however, the paste oozes out in a light brown colour with an orange tint. It is sugary in taste, oily in texture, and very sticky. It is difficult to get off clothes and it coats one’s hands with an oleaginous film, which is hard to remove without soap.

On the tongue, the paste is granular but not crunchy and it certainly tastes like peanut butter – although sweeter and greasier than the kind you would buy in a supermarket. Its

ingredients reflect this, since Plumpy'nut® is dominated by sugar and vegetable fat, combined with skimmed milk powder, whey powder, vitamins, stabilizers and emulsifiers. On the packet one can see the distinctive logo, which features bouncing peanuts in place of the apostrophe, and the letters RUTF, an acronym for 'Ready to Use Therapeutic Food'. This indicates its purpose in feeding the most severely malnourished – those who have been measured or weighed to confirm muscle and fat wastage. Indeed, many aid agencies treat Plumpy'nut® like a medicine, prescribing it according to a specific dose and labelling it as a lifesaving drug. In earlier versions of the packet there was the image of a doctor on the side to underline this medicinal purpose, printed along with the legend 'Under Medical Supervision'.

On first encounter, the whole package seems both overblown and underwhelming because it is, fundamentally, a food repackaged as a drug. Plumpy'nut® is often described as 'peanut butter in a silver packet', a phrase that captures its central simplicity, but ignores its context, history and networks of production. Indeed, there are two features that make this product so remarkable, and they both relate to the way it comes 'Ready to Use'. First, Plumpy'nut® does not need to be prepared, cooked or reconstituted, and second, it is designed to be administered by a non-specialist. These make Plumpy'nut® much more than just peanut butter in a futuristic packaging, as well as giving the product its distinctive stickiness, or viscosity: a limited adaptability that allows it to change in response to new circumstances whilst maintaining some kind of shape and central purpose. As I will demonstrate, these features stand in great contrast with earlier techniques for tackling severe malnutrition, particularly therapeutic milks that were not 'Ready to Use' at all. Such milk-based products had a lower viscosity, flowing more easily and less resistant to deformation. Their fluidity came with a risk, since they could change in dangerous ways.

These previous approaches to therapeutic feeding involved administering fortified powdered milk, formulae such as the F-100 or the F-75, which had to be reconstituted in

water before they could be used.³ This was deeply problematic because therapeutic feeding of the severely malnourished is always a delicate, dangerous act that requires a great deal of care, especially when dealing with young children and dirty water. The problem is simple: fluid formulae can be contaminated, which poses significant risks. Diarrhoea is the enemy of recovery. Milk-based technologies, therefore, were problematic because they were unstable, especially given the shortage of safe water in many humanitarian emergencies. If left uncovered in a hot and humid clinic, or made with contaminated water, these formulae began to create alliances with microbes, which produced a fluid that was not so much life-saving as life-threatening (Beisel and Schneider, 2012). It was *too* adaptable, *too* changeable, and that was the problem.

Plumpy'nut® was designed to lack this fluidity. Its material stickiness was designed to be its most central advantage. The energy in a Plumpy'nut® sachet comes primarily from fat, so it can have a lower moisture content, which means bacteria find it very hard to thrive even when the product is left unrefrigerated (see Chaparro and Dewey, 2010). According to the promotional literature, Plumpy'nut® can last a long time without spoiling – it has a shelf life of up to 24 months. Whereas therapeutic milk is fluid, flexible and potentially dangerous, Plumpy'nut® is sticky, inflexible and safer.

This viscosity of Plumpy'nut® – its resistance to flow, change, and deformation – is extended by its packaging, which seals the paste in a protective film and gives it clear boundaries. Unlike a fluid pool of reconstituted therapeutic milk, each portion of Plumpy'nut® is individually wrapped and can be held, weighed in the hand, or kept in a pocket. Therapeutic milk lacked such clearly defined boundaries; it had to be carefully measured and administered by an aid professional. Plumpy'nut®, on the other hand, is packaged so that a single sachet provides a single person with exactly 500 kilocalories of

energy. It can be prescribed according to a standard protocol, and anyone can count two or three sachets a day to provide a child's necessary nutrients.⁴

Plumpy'nut®, therefore, is 'Ready to Use' not just in the sense that it requires no reconstitution or preparation; it is also 'Ready to Use' because it is packaged to be administered by anyone who can count the sachets and identify a dose. This is crucial to its success. Unlike a fluid technology, it does not have boundaries that flow. It does not reach out to a wide community of people. It is not easily contaminated and does not easily change. Plumpy'nut® is sticky in form, stable in purpose. But it is not completely immutable, because like all foods, it eventually deteriorates.⁵

Plumpy'nut® in use

The success of Plumpy'nut®, however, goes beyond these material features and resides in the way it is actually *used*. Plumpy'nut®, to put it simply, works through people; in Latourian terms, it enters alliances that hold together with a degree of permanence. To really understand the product and its distinctiveness, therefore, we need to examine how it is put into practice, how it is inserted into systems and structures, how it is used to dramatic effect. For this, we have to observe it in humanitarian emergencies, in the hands of aid workers and patients.

I first encountered Plumpy'nut® in a remote refugee camp on the border of Sudan and South Sudan in 2012, where I was examining humanitarian objects in all their diversity, from oral rehydration solutions to four-wheel drive jeeps.⁶ Plumpy'nut® was one of the most pervasive, visible, and immediately recognizable objects in the camp. I found it packed in boxes and stacked in great piles within the enormous, tent-like temporary warehouses called Rubb Halls. I saw its empty sachets littered around the sparsely wooded terrain. I observed families leaving carefully fenced-off clinics clutching clusters of the product in large plastic bags. The very portability of this product was one of its most obvious features, as it appeared

and reappeared in multiple sites. It soon became clear to me that this was precisely the point: Plumpy'nut® had been designed for mobile clinics and ambulatory care, it was meant to provide assistance to people on the move. After observing its distribution in two different environments – first as part of an outpatient service, and second as part of a larger food distribution scheme – I realized that the key characteristic of the product was its stickiness. Not just its *material* stickiness, but also the way it 'stuck' to human behaviour. Its viscosity introduced friction (Tsing, 2005), which prevented certain kinds of use, slowed its fluid adaptability, and subtly shaped the way that people acted. This made it particularly suitable for the treatment of severe malnutrition in the home.

The procedure for issuing Plumpy'nut® is relatively standardized, although exact protocols differ from place to place. In South Sudan, it began with nutritional assessments using a MUAC (or Mid-Upper Arm Circumference) measuring tape, which was wrapped around the bicep to quantify the wasting of the upper arm. This tape was colored with red, orange and green sections to indicate different levels of malnourishment, with red indicating the most serious condition: severe acute malnutrition. In the refugee camps of South Sudan, screening for severe malnourishment seemed to be a regular feature of life. Large teams of community outreach workers would disperse throughout the refugee settlements, collecting children together, lining them up, and measuring their arms in a rapid procedure that resembled a production line. I joined these teams on many of their visits, which involved a great deal of walking over marshy ground and under sparse tree cover to find every child right to the very edges the inhabited area. Such screenings would also take place during routine activities in the humanitarian compound: at a hygiene education session, for example, or during the distribution of oral rehydration salts, when a MUAC tape would often be taken to children's arms. The idea was that this portable tool could be used by anyone, in multiple locations, to identify who needed Plumpy'nut® urgently.

If any of these measurements yielded a red MUAC measurement, the malnourished child (or rather, their carer) was sent away with a referral slip for one of the outpatient clinics in the camp. When it was available, they were also given a small quantity of Plumpy'nut® so they could start treatment straight away – i.e., before they were formally registered by the humanitarian agencies running ambulatory care. Once they arrived at the clinics, a more detailed regime of measurement began. The MUAC reading was supplemented by weight and height measurements, which were carefully recorded in a ledger and on a registration card. To these would be added other crucial details such as name, camp sector and an identity number. The malnourished child would then be prescribed two or three Plumpy'nut® sachets to be eaten each day, depending on their age and weight. These rations were given as a fortnight's supply and taken home, with over forty sachets often provided at one time – this explained the large plastic bags filled with Plumpy'nut® grasped in the hands of adults leaving humanitarian compounds. After two weeks, the child was required to return to the outpatient clinic with empty packets of Plumpy'nut®, which was meant to demonstrate that the product was being consumed rather than traded. At this follow-up visit the child would be weighed and measured again, their details added to the records, and any progress in recovering from malnutrition noted. The process would be repeated every two weeks until the child returned to an acceptable weight and size.

As pointed out in the previous section, the form of the Plumpy'nut® packet made it suitable for this kind of treatment: The sachets delivered exactly 500 kilocalories, making them easy to count and calculate. They were sealed with clear boundaries, making them simple to administer at home. Their stable form and long shelf life meant minimal risk to the child. Plumpy'nut®, therefore, stood in great contrast to the older method of administering therapeutic milks, which had to be handled carefully by trained staff because they were liable to spoil. Whereas therapeutic milks had to be reconstituted in hygienic conditions and

measured carefully because they lacked clear boundaries, Plumpy'nut® required less intricate forms of care. Whereas therapeutic milk required not just the powder itself, but a supply of clean water, a set of sterilized receptacles, a clinic with beds, a staff of medical professionals and a regimen of careful feeding, Plumpy'nut® was small, simple and effective. It is another example of a 'microworld' in humanitarian design (Redfield, 2012), in that it operates without extensive daily networks.⁷

This is why Plumpy'nut® is so often described as a 'revolution' in the treatment of severe acute malnutrition. Previously, children had to be supervised around the clock and accompanied by an adult carer in the clinic – a procedure that was resource intensive and costly for both the aid agencies and the families concerned. In situations of dire poverty and numerous children this was particularly difficult, mainly because an adult had to commit to staying beside their child when crops needed harvesting, money needed to be earned and other children needed to be cared for. Not surprisingly, many parents withdrew their children from the clinics, making default rates very high and survival rates very low.⁸ Plumpy'nut®, it is generally accepted, changed everything (Briend and Collins, 2010; Collins et al., 2006). It allowed treatment to take place at home. This generated greater effectiveness and a wider reach, as an advantage of outpatient treatment. Plumpy'nut® also generated safety through stability, and stability from a distance: It worked in the absence of clean water, sterilized equipment, hospital beds and trained medical staff. This was only possible because of the stickiness of the product. Not just its *material* stickiness – its comparative stability, its bounded form – but also its *behavioural* stickiness. The most remarkable feature of Plumpy'nut®, after all, was not so much the nutritional makeup of the packet's contents, but the packet itself. This, as we will see, offers a set of crucial limitations in the way the product can be used.

Another comparison is illustrative here, as Plumpy'nut® can be contrasted with fortified humanitarian foods, which come in large bags used over the course of several days. Corn-Soy Blend (CSB) is one example (see Scott-Smith, 2015a). As explained in the accompanying protocols, these bags of 'dry rations' can be dipped into and measured out in a variety of ways. Food in this form is easy to share. It is often treated as a resource for the whole family and cooked in a communal pot. Aid workers, however, try to discourage recipients from sharing such rations because they have been provided on the basis of a *specific* nutritional assessment; they are meant to treat an *individual's* malnutrition. This shows again how viscosity is a matter of degrees. Plumpy'nut® is even more difficult to share than CSB, because it comes in a personal sachet. It is more difficult to transform than CSB, because it cannot be made into different final foods. Its stickiness influences behaviour to an even greater extent than CSB, because it adheres to everything – clothes, hands, hair, foil – and so is predisposed to remain in its packet. For recipients, in other words, it makes little sense to deposit Plumpy'nut® onto a plate or other receptacle, since it is so sticky that much of the paste remains in the packet even when it is squeezed into the mouth. Neither does it make sense to add Plumpy'nut® to a pot of other food, because it is delivered in personalised sachets that would not go very far in a meal for a whole family. Plumpy'nut®, in short, is stickier than CSB because its form, packet and protocols provide restrictions on use.

The presentation of Plumpy'nut® further restricts its adaptability, because it is prescribed by clinicians as a single dose of medication for a sick individual. In other words, it is treated as an individual, rather than a communal, ration. The effect is clearly visible: I observed many people tear off the corner from a packet of Plumpy'nut® and put it in their mouth during my fieldwork, but I never saw people passing the sachet around, sharing the peanut paste from mouth to mouth, or squeezing it into a pot of food. This is not to say that

Plumpy'nut controls behaviour perfectly; after all, humanitarian donations can always be adapted and manipulated by their users, as much of the literature on humanitarian aid attests. Condoms can be used to clean shoes or transport tobacco (Autesserre, 2014: 112; Vogel, 2014). Toothpaste can be used as a skin and beauty treatment (Burke, 1996: 172-214). Cocoa – once a common humanitarian foodstuff – can be used to paint walls rather than nourish bodies (Fuller, 1956: 1-15).⁹ Everything has some degree of fluidity, and can be used and appropriated in ways never intended by their designers. This, to reiterate, is why viscosity is so useful as a concept: It underlines that everything is fluid, but that change and control occurs at different levels, at different speeds, and with varying levels of friction. Some fluidity is always present.

The Plumpy'nut® packet, which has been designed to offer a limited protection against unauthorized sharing, tends to work quite well at offering this resistance. People treat it as an individual portion of food rather than adding it to communal meals. But there is another kind of adaptation, which is more common and highly visible: the recirculation of Plumpy'nut® as a commodity. In conversations with aid workers in South Sudan I found a recurring suspicion and constant vigilance against this perceived 'misuse' of Plumpy'nut®, which involved its sale, exchange and circulation through unauthorized channels. The procedure of returning empty packets I observed in South Sudan was one way to regulate this circulation of Plumpy'nut®, and in other circumstances, aid staff tried other techniques, for example monitoring its exchange by cutting off the corners of certain sachets to try and identify them in the market. I had the list of potential abuses set out to me by one expatriate nurse during a memorably quiet afternoon in a mobile clinic. Drawing on a variety of episodes from a long humanitarian career, she told me how this emergency food could be co-opted and misused in multiple ways. Plumpy'nut®, she said, could be found for sale in local markets, even though it was originally given out by aid agencies for free. It could be seen in

the mouths of seemingly well-nourished adults, even though it was designed for children. Some families, she claimed, ‘lost’ the outpatient armband of their malnourished child so they could register the same child twice over. Others swapped the armbands from child to child, depending in their weight. There was a vibrant trade in registration cards and referral slips – a practice that has been described as ‘card games’ (Bulley, 2014: 73-4; Horst, 2006: 94-5). There were also some worse rumours, such as the stories of mothers keeping a child malnourished in order to maintain a supply of rations, or fathers tying string around the limbs of a child to give them oedema (swelling) – one of the key indicators of severe acute malnutrition.¹⁰

I heard similar stories from other informants, but it was difficult to establish how common these situations were, and whether the stories were genuine or apocryphal. I certainly observed Plumpy’nut® for sale in local markets, but never saw anyone deliberately neglecting their babies to leverage a supply of the peanut paste. Many forms of manipulation in the delivery of aid have been documented by anthropologists and journalists (Agier, 2011: 152-5; Bulley, 2014: 73-4; Horst, 2006: 82-96; Peteet, 2005: 72; Sanyal, 2011: 881–882) and there is undoubtedly a degree of ‘leakage’ in the system because the protocols are deliberately designed to give more sachets per child than is strictly necessary for their calorific needs (Stellmach, 2016). There are, without doubt, many ways to ‘cheat the system’: subvert the processes that are designed to ensure a firm and controlled approach to feeding, often with productive results. In the end, however, the lesson is an unsurprising one: that no technology is perfectly watertight, perfectly controlling, or perfectly stable. Control can be lost, and the ultimate aim of any feeding programme – to guide nutrients into specific malnourished bodies – is always open to subversion, regardless of whether one views that subversion as positive and negative.

Plumpy'nut®, therefore, is difficult to manipulate. It changes in some ways – reappearing, for example, as a tradable commodity on a market stall – but it generally holds its shape and serves its intended purpose. Unlike a fluid technology, it is not open to widespread change and adaptation. It remains more resolute: difficult to share, adhering to a certain model of behaviour, and shaping its users rather than flowing around their demands.

Plumpy'nut® owned

Fluid technologies, in the sense developed by de Laet and Mol, have a loose and open system of ownership. They are not subject to copyright or trademarking, but are part of the public domain. The bush pump was not controlled by anyone – not even its inventor, who refused to file a patent – and the product was widely available to own, manufacture and use. Redfield's description of the LifeStraw® complicates things a little, because the LifeStraw® has a more inflexible ownership model: It is policed and regulated by trademarks and it cannot flow around the world to be manufactured, owned and adapted at will. With its patent, its production by a single company and its careful control over the use of registered trademark, the ownership of the LifeStraw® is barely fluid at all. Plumpy'nut® falls in between these extremes: more fluid than the LifeStraw® in its ownership, but firmer and stickier than the bush pump.¹¹

According to most accounts, Plumpy'nut® was invented in the mid 1990s, when the French paediatric nutritionist, Andre Briend, had a 'eureka moment' while looking at a jar of Nutella (a hazelnut breakfast spread). Briend was a researcher at the French Institute for Research and Development (IRD) at the time, and was well aware of the limitations of therapeutic milk for treating starvation. Like others in this period he was considering how to develop a highly nutritious food that did not require preparation in sanitary conditions, by trained personnel. According to the standard account, he was sitting at breakfast one morning

when inspiration hit. ‘His eyes locked on the jar of Nutella sitting on his kitchen table [and] he studied the label, comparing the contents to those of the famine foods recommended by WHO.’ Briend found that there was a striking similarity between the two, and an idea came to him: why not make therapeutic food into a paste? The paste, of course, came to be based around peanuts rather than chocolate, but, according to the story, the idea was born on that day (Rice, 2010).¹²

Myths of origin tend to obscure the genuinely collaborative processes that go into new innovations, and Plumpy’nut® is no exception. Briend certainly had the initial inspiration, but Plumpy’nut® would not have come into production without a whole network of other people. When I interviewed him in June 2016, Briend was keen to acknowledge this history. Like Peter Morgan, the creator of the bush pump, he came across as a modest man, seemingly uninterested in money or publicity.¹³ Briend told a long story how the idea was based on previous products for therapeutic feeding – most notably the standardized F-100 formula developed by Michael Golden of the University of Aberdeen – and how it would never have come to fruition without the involvement of a manufacturer called Nutriset.¹⁴ Indeed, Plumpy’nut® is best described as a joint endeavour by Andre Briend at the IRD and Michel Lescanne at Nutriset. Since Briend had no experience in food manufacturing, Lescanne complemented Briend’s experience in paediatric nutrition with a background in food technology and, jointly, they brought the product to market.

As Briend explained it, there were three main challenges in the development of Plumpy’nut®. First, there was a nutritional challenge, which involved coming up with the right balance of nutrients in the product. This was largely solved in the 1980s, with the standardised F-100 formulae of Michael Golden. Second, there was a reputational challenge, which involved convincing humanitarians to change their existing practices. This was more difficult, as experimenting with the new product was seen as unnecessarily risky,

undermining the expertise of nutritionists and placing the lives of malnourished children in danger. Finally, there was a technical challenge, which involved embedding nutrients in a lipid matrix, manufacturing the spread, and then finding a way to package the result. This is why Briend relied so heavily on Lescanne – he had no experience of mass-producing a paste of this kind, and packaging that paste was an even bigger challenge. The oily, viscous Plumpy’nut® made foil sachets difficult to seal. The packets kept opening, splitting, and the glue kept failing. The expertise of Lescanne, therefore, was crucial in meeting the challenge.

Given that the packet itself is so important to the success of this food – framing, bounding, and delimiting its use – the partnership they created was key. In Briend’s account of innovation, it broke ground by reaching out across the disciplines and embracing lessons from food technology, bacteriology, and nutrition.¹⁵ Lescanne’s company, Nutriset, took the idea and made it viable. They became the principal producer of Plumpy’nut®, and after beginning manufacture in 1996, they filed a patent to recover their costs – filed first in France in 1997, and then in the USA the following year.¹⁶ Initially, this patent was not really questioned or criticized, but once the product began gaining acceptance as the best treatment for childhood malnutrition, a battle over ownership began.

The first Plumpy’nut® field trials took place in Chad in 1997, and were published in the *Lancet* (Briend et al., 1999). This was followed by further trials in Ethiopia and Malawi, with a pair of particularly influential papers appearing based on these results (Collins and Sadler, 2002; Manary et al., 2004). The Niger famine of 2005 allowed the product to be used in a serious emergency on a large scale, and over the following years evidence began to be accumulated, the efficacy of the product began to be proved, and agreement was gradually reached (Ciliberto et al., 2005; Diop et al., 2003; Linneman et al., 2007).

By 2007, the process of acceptance was complete: Plumpy’nut® received international approval from the World Health Organization (WHO), the World Food

Programme (WFP) and Unicef. In a joint statement, the UN bodies recommended Plumpy'nut® for the majority of malnourished children, who could now be treated at home through a procedure that had become known as the 'community-based management of severe acute malnutrition' (World Health Organization, 2007). In this way, Plumpy'nut® – or, more generally, Ready to Use Therapeutic Foods (RUTFs) – became a standard part of the toolkit for managing malnutrition.

As a result of this success, the patent became a topic of controversy. At the end of 2009, over the space of a few months, Nutriset was hit by criticism from two influential quarters. First, MSF published an open letter criticizing the company for its restrictive licensing policy and for aggressively guarding its patent.¹⁷ Second, a pair of non-profit organizations in the United States took Nutriset to court, asserting their right to produce a similar product.¹⁸ Nutriset had already warned a third company, based in Denmark, about infringing their patent, so critics felt that they had enough ammunition to accuse the company of maintaining strict and unnecessary control over ownership. The patent was seen as particularly harmful because RUTFs had become the recommended treatment for the majority of malnourished children, and restricting ownership seemed to be limiting access to a lifesaving treatment. The patent also had wider ramifications because it covered too much, impeding the production of RUTFs in general. For its detractors, Plumpy'nut® was too simple to be patentable. It was, after all, just peanut butter in a packet. According to one MSF representative, Plumpy'nut® was being protected by a patent that was so broad that someone could be in violation by just adding a single additional micronutrient to a jar of Nutella.¹⁹

This criticism generated publicity, and it certainly placed Nutriset under pressure, but it did not change the ownership of Plumpy'nut®, which remained as sticky as it had always been. Nutriset, from the very beginning, had never maintained perfectly tight controls over the production of Plumpy'nut®, preferring to embrace a degree of fluidity even before the

legal challenge. In 2005, for example, it had established a network of local producers called PlumpyField®: a franchise system in which developing world producers were supported to produce peanut paste under the Plumpy'nut® name, receiving technical support on manufacture and quality control.²⁰ PlumpyField® was Nutriset's way of widening ownership of its products. The company described the system as bringing benefits to local communities by contributing to economic development and industrial capacity, and by cutting the cost of transportation.²¹

With eleven countries in the PlumpyField® network, the franchise introduced some fluidity into the ownership of the peanut paste, but expansion was limited and the spread was restricted. Nutriset let go of exclusive production and diversified ownership, but it only worked with carefully selected partners, setting clear conditions on their involvement whilst remaining willing to defend the patent when other producers stepped on its toes (as MSF's letter and the US legal challenge attest). Nutriset did not, however, defend the patent in full. It developed a 'Patent Usage Agreement', which was a simple online form that licensed companies *not* in the PlumpyField® network to produce their own versions of the therapeutic food. After filling in the form, producers could be given non-exclusive authorization to use the patent, but only if they agreed not to use the name, logo or distinctive design, kept production and ownership of the company in the global south, and made a 1% contribution of their turnover to IRD.²² The ownership of Plumpy'nut®, therefore, had a degree of viscosity from the very beginning. It was fluid in the sense that it enabled and encouraged local production, but stickier in the sense that it retained a patent, defended it, and set rules for authorized production.

This became a successful strategy for Nutriset. After publicizing its 'Patent Usage Agreement' in 2011, the negative publicity died down, demand for the product continued to grow, and the company found markets for more specific products – such as 'Supplementary

Plumpy', or Plumpy'sup®. As a mark of this success, Nutriset received the 'Patents for Humanity Award' in 2015 and continued to maintain the same central arguments, suggesting that patents can protect local production and prevent a flood of cheap foreign-made imitations. Plumpy'nut®, therefore, developed a complicated ownership structure, placing it neither in the public domain, nor under a stringent trademark. It operates with a network of local producers and an easily negotiated 'patent usage agreement'. This makes it neither fluid, nor fully stringent in its ownership.

Conclusion

Nutriset successfully defused the criticisms that were accumulating in 2008-10, but over the last few years activists have targeted the peanut paste for another reason: for suppressing structural change and distorting local markets. This opposition emerged most forcefully in India, where the Right to Food campaign suggested that Plumpy'nut® was a Trojan horse for the international food industry, its distribution doing nothing to address the underlying causes of malnourishment such as poverty and powerlessness (Doyon, 2011). Campaigners argued that Plumpy'nut® has simply narrowed the problem to a microscopic level, focusing on nutrients at the expense of structural injustices. They criticized aid agencies and nutritionists for pushing Plumpy'nut® as something extraordinary, when it was just a packet of peanut butter. They objected to the way Plumpy'nut® enabled treatment at home, arguing that any response to malnutrition should involve *increasing* points of contact between marginalized groups and the rest of society rather than decreasing them and medicalizing hunger. These criticisms also appeared in other places, such as in Niger, where the dominance of Plumpy'nut® was described by one author as a 'medical coup' (Jézéquel, 2015).

It is easy to love fluidity, but stickiness is another matter. In the twenty years since inspiration hit at Briend's breakfast table, Plumpy'nut® has become many things to many

people, generating a wide variety of responses. In its early days, it was considered a dangerous challenge to existing in-patient feeding regimes. Later, it was hailed as a ‘miracle’ food and described as a ‘cure’ for malnutrition in general. After the patent controversy, it was accused of becoming a commodity and a fetish. In more recent years campaigners have accused the peanut paste of being a distraction from longer-term structural change (Briend, 2013; Doyon, 2011; Scott-Smith, 2013).

This raises questions about the very nature of Plumpy’nut®. De Laet and Mol (2000: 237) ended their analysis of the bush pump in similarly ontological terrain, asking, what *was* the bush pump, in the end? Was it a ‘water-producing device, defined by the mechanics that make it work as a pump’? Was it a ‘type of hydraulics that produces water in specific quantities and from particular sources’? Was it a ‘sanitation device ... [with the] concrete slab, mould, casing, and gravel also essential parts’? They concluded that the bush pump was all of these things: It had no static essence, it was constantly changing, and parts could be removed and replaced while maintaining a similar function. The operation of the bush pump, in other words, required an ever flowing and expansive community of people, which embraced its immediate users, their wider communities, right out to the Zimbabwean nation itself.

How does this relate to my analysis of Plumpy’nut® as a ‘sticky technology’? Can we speak of Plumpy’nut® as fundamentally viscous? Ontologically viscous? Certainly, compared to the bush pump, its boundaries are clearer and it is easier to define. Plumpy’nut® comes sealed in its packet; its boundaries are relatively stable; its constituent parts are not separable. Plumpy’nut® is almost impossible to take apart and adapt, and difficult to share; and most crucially, Plumpy’nut® has been designed to work on its own, without the cumbersome feeding clinics that it replaced. As I have argued in this paper, it is sticky in its

form, in ownership, and in use. But does this make it fundamentally, ontologically sticky in the same way that the bush pump was fluid?

Given the lengthy story behind the development of Plumpy'nut®, it is unsurprising that the paste is at least *partly* fluid in this sense. First of all, its nature can change. By mimicking the questions posed by de Laet and Mol, we can ask: is it a lifesaving product or a Trojan horse for the global food industry? Is it a miracle drug or a normal food? Is it a cure for malnutrition or an insufficient stopgap? And we have to conclude that yes, like the bush pump, it can be all of these things. It is ontologically flexible, fundamentally fluid. But then again, Plumpy'nut® retains *some* solidity behind these different narratives. It retains a relatively stable purpose whether presented as an essential medicine in the hands of an aid worker, a tradable snack on a market stall, or a fetishized commodity in the pamphlet of an activist. In all of these cases, it is a source of nourishment. Plumpy'nut® sits relatively tightly in a network that does not – as with the bush pump – extend to the nation. Rather, its very success emerges from its everyday sequestration in a sealed silver packet. Its purpose is limited: building back bodies from the brink of starvation, but never attempting to address the underlying situation that made people hungry. Indeed, it is meant to work precisely by eschewing the ever-widening circles involved in operating a technology like the bush pump. Unlike the bush pump, it does not require a functioning community. It does not try to serve the nation. And as the Plumpy'nut® packet explains with some degree of naivety, its purpose and operation are narrow and simple: all you need is to knead the sachet, tear and open, then squeeze and eat.

This leads me to conclude that sticky technologies are ontologically more stable because they have a tighter, more limited vision. This is the source of their very success, particularly in the world of humanitarian aid. Doctors, faced with sick and injured people, look to stabilize their patients: stopping blood streaming out of wounds, containing bodily

fluids, firming up faeces and halting diarrhoea. Similarly, humanitarians look to viscosity for a firm and effective intervention. When everything is in flux, aid workers do not want technologies to be fluid and adaptable. They want something viscous, something that limits human behaviour in order to save lives. This, in the end, is what makes Plumpy'nut® so useful in emergencies. The stickiness of its form, the way it sticks to certain kinds of behaviour, and the stickiness of its ownership gives it predictability, introducing friction to fast moving conditions.

In 2012, Uli Beisel and Tillman Schneider published a paper with the intriguing subtitle 'The transformation of Ambulance Car 7/83–2 to Tro-Tro Dr. Jesus'. It told the story of a German ambulance that was converted into a Ghanaian minibus. In their description of these alterations, Beisel and Schneider showed how a life-saving vehicle could become a life-threatening form of mass transportation, pointing out that fluidity is not necessarily a positive quality. When ambulance 7/83–2 was moved from one context to another, changed and adapted, emptied of medical equipment and crammed with benches and passengers, it was given a new life, but it endangered human lives in the process. The new minibus was barely roadworthy, squeezed too many people into its interior and had no safety features. This was a story of adaptability, to be sure, but it was also a story of danger. Beisel and Schneider concluded that we must pay more attention to 'gentleness of change', pointing out that fluidity was only valuable if we are sensitive to the speed and ease with which an object can adapt to a new environment and respond to its users' demands.

Viscosity creates this 'gentleness of change'. It introduces friction and a landscape of textures, which is particularly welcome in the rapidly changing circumstances of a humanitarian crisis. In these environments, aid workers need elements of both fluid and immutable objects. They need sticky technologies, which have boundaries that flow, but not

quickly; users that are constrained, but not fully; a purpose that is defined, but not clearly. They need technologies that are sticky in form, sticky in ownership, and sticky in use.

Acknowledgments

This paper has benefitted immensely from discussions at three related workshops: ‘Humanitarian Goods’ held at the University of Edinburgh in June 2015, ‘Humanitarian Objects’, held at the University of Oxford in July 2016, and ‘Humanitarian Designs’, held at the University of Sussex in June 2017. I owe thanks to all contributors at those workshops for their comments, particularly Jamie Cross, Anke Schwittay, and Alice Street. I have also benefited from conversations with many humanitarian workers and practitioners, particularly Steve Collins and Jean-Hervé Bradol for their comments at a workshop at the School of Oriental and African Studies in London. Thanks to the editors, contributors and reviewers at SSS, and especially to Peter Redfield, Marianne de Laet and Annemarie Mol for their enduring, stimulating and constructive scholarship on this topic.

Notes

¹ For more details of this approach and its detailed procedures, see the handbooks produced by the World Food Programme (2001) and World Health Organization (2000). Supplementary food is designed for moderately malnourished individuals, and so has a distinctive purpose in humanitarian action. It is contrasted with therapeutic food like Plumpy'nut®, which are, in contrast, designed for the severely malnourished.

² As one of the anonymous reviewers of this paper pointed out, this looks a lot like a form of humanitarian governmentality (Larner and Walters, 2004), but it is more complex, involving a material imprint in clearly bounded inflexible objects that sustain biological lives as well as shaping social conduct.

³ F-75 and F-100 (or Formula 75 and Formula 100) are based on powdered milk, and were designed to treat severe malnourishment. The numbers indicate the number of kilocalories that are contained in 100ml of fluid. Malnourished patients are usually given the F-75 formula first (containing 75 kcal per 100 ml and 0.9 g protein per 100 ml). Then, once their appetite and condition have improved, they are moved onto F-100 formula (100 kcal per 100 ml and 2.9 g protein per 100 ml).

⁴ The most recent protocols can be found at <http://www.plumpynut.com/file/c67d0472-a29f-48c9-984e-4082b5c725ca/plumpy-nut-booklet.pdf> on page 9.

⁵ Plumpy'nut® can withstand extremes of temperature and long journeys, which makes it more stable than therapeutic milk. But the product is not *perfectly* stable. I kept a sachet of Plumpy'nut® in my desk drawer for demonstration in lectures, carrying it around well beyond its 24-month shelf life, and eventually, when I decided to eat it, I found a food that had ceased to be sticky. It had solidified, becoming harder, crumbly and very unpleasant to eat. This shows not just that Plumpy'nut® eventually deteriorates, but also that stickiness has an aesthetic quality. Plumpy'nut® was nice when sticky, but once it had become crumbly, devoid of moisture and fluidity, it was harder to consume. This point can be underlined by comparing Plumpy'nut® to the BP-5: another emergency ration that comes in the form of a large, vacuum-packed biscuit. The BP-5 has a very long shelf life because it has no moisture in it at all, and resembles a paler version of the breakfast cereal Weetabix. Indeed, eating the BP-5 is a similar experience to munching on Weetabix without the milk: tongue-grating, spit-sapping, unpleasant. Children and others have been known to play a game that involves trying to eat as many cream crackers as possible without drinking water. Since the crackers contain no moisture and it is difficult to produce enough saliva, one cannot consume more than a few at a time, and the 'game' really involves watching the eater struggle in a cloud of cracker crumbs. Consuming a BP-5 can be a similar experience, lacking stickiness.

⁶ The primary fieldwork on which this section of the article is based was undertaken in the Upper Nile State of South Sudan, and the Mafrq governorate of Jordan between June and August of 2012. During this period, I was embedded as a participant observer in two large international humanitarian organizations implementing food and nutrition programmes in the emergency stages of a recent refugee crisis. Other observations of feeding schemes which also informed my analysis took place in Malawi 2007 and Cameroon 2008.

⁷ To be clear, both therapeutic milk and Plumpy'nut® require wide infrastructures and techno-scientific expertise, but Plumpy'nut® emphasizes them at the site of production rather than the site of distribution. Nevertheless, the simplicity of Plumpy'nut®'s distribution is still crucial to its success. These networks are hidden, and they do not exist at the point of delivery, which is why Plumpy'nut® is another example of Redfield's 'microworlds'. I am grateful to one of the anonymous reviewers of this article for helping me clarify this point.

⁸ Despite this, in-patient feeding has not been completely replaced in contemporary humanitarian aid: it is still used for the most dangerously malnourished, as well as for those with medical complications. The use of clinics and therapeutic milk, nevertheless, is much less common than it was twenty years ago.

⁹ I am grateful to Emily Baughan for alerting me to the cocoa example.

¹⁰ Malnutrition has been classified in various ways over the past sixty years, and often a distinction is usually made between two types of protein-energy malnutrition: marasmus, which is characterised by wasting, and kwashiorkor, which is characterised by swelling (oedema). The presence of oedema is usually taken as a key indicator of severe acute malnutrition. See Golden (1998, 2002) and Waterlow (1992).

¹¹ If we consider the LifeStraw® in a newly viscous light, we might argue that, far from being a perfectly fluid technology, it is actually rather sticky. Its ownership is certainly not fluid, since it has a trademark and no patent usage agreement. Its boundaries are not fluid either, since it is less reliant on community involvement and is more individualist than water-producing technologies like the bush pump. The product may be fluid in market terms – as a commodity – but its stated aim is to produce a stable water supply when usual water sources are contaminated or insecure. Indeed, the mechanism of the LifeStraw®, which traps pathogens inside a hollow fibre membrane, could be seen as a perfect example of viscosity: transforming a dangerous, unstable, and capricious water supply into something stable and safe. It does this, of course, by ensuring that unwanted microbes literally 'stick' to its interior. Stickiness is a continuum, but the LifeStraw® certainly sits somewhere

in this range. In this landscape of viscous ownership, we might imagine the bush pump as a superfluid, the LifeStraw® as a resin, and Plumpy'nut® as sticky as treacle.

¹² The quotations in this version of the story have been taken from Anderson, T. 'Andre Briend' at www.scienceheroes.com. Many reports are based on an interview with Andre Briend conducted by Ian Simpson and broadcast on 22nd October 2007 by the WHO Media Centre and available at www.who.int/mediacentre/multimedia/podcasts/2007 (accessed 26 June 2017).

¹³ A *New York Times* journalist learned this when trying, in vain, to get an interview (Rice, 2010). The information in this paragraph has been taken from an interview with A. Briend by the author, 15th June 2016.

¹⁴ Nutriset was founded in 1986 to develop 'innovative solutions' for humanitarian nutrition. Its aim was to 'act as an interface between the worlds of humanitarian aid, nutritionists and food industry technologies'. By the early 1990s Nutriset was already manufacturing ready-to-use sachets of F-100 – packets of Golden's milk formula that were pre-mixed and dehydrated and so did not have to be mixed from scratch onsite. These 'ready-to-use' versions of F-100 were considered safer as they eliminated human error and did not rely on the expertise of the user. Nutriset were also experimenting with less fluid versions of therapeutic milk even before Plumpy'nut® came into production in 1996. For more, see Enserink (2008).

¹⁵ In an interview on 15th June 2016, Briend emphasized this process of innovation in terms of multi-sectoral learning. He brought knowledge of nutrition and contamination from previous work in Bangladesh, with an emphasis on the importance of dried foods and the dietary requirements of children. Lescanne brought knowledge of industry and food technology, with emphasis on the manufacture of spreads and packets. Together they connected knowledge that was obvious in their own fields. See also Andre Briend, Global science for global health: Innovation and Health in Developing countries, presentation at DIH, Tampere University, June 2011.

¹⁶ WIPO: High Energy Complete Food or Nutritional Supplement, Method for Preparing Same and Uses Thereof: WO2002034077. US version of the patent, no. 6346284 (or US PCT Application Number PCT/FR98/02469). This was also the subject of French Patent 2771259, European Patent 1032280, Canadian Patent 2312025, and applications in the ARIPO and OAPI (English and French-speaking African countries). Nutriset has filed other patents and protections to cover parts of the manufacturing process and product names.

¹⁷ The letter, written by Tido von Schoen-Angerer, the director of MSF's Campaign for Access to Essential Medicines, was addressed to Mrs Isabelle Lescanne, the general manager of Nutriset. It is available at http://www.msfacecess.org/sites/default/files/MSF_assets/MaINut/Docs/NUT_letter_NutrisetPatent_ENG_2009.pdf (accessed 26 June 2017).

¹⁸ This case was brought by Breedlove Foods and the Mama Cares Foundation, who sought but failed to obtain a declaratory judgment action (a pre-emptive measure against a possible lawsuit) from the US District Court of Columbia that by producing their own version of Plumpy'nut® (which was called Re:vive) they would not be infringing the US patent held by Nutriset (BBC News, 2010; Doyon, 2011; Enserink, 2008; IRIN News, 2010). Tabatchnick Fine Foods, another US company, also challenged the Nutriset patent.

¹⁹ This quotation came from Stéphan Doyon, leader of Nutrition Team at MSF (IRIN News, 2009). Nutriset's patent described the product as a mixture 'coated with at least one lipid-rich substance optionally derived partly from oleaginous seeds', which could come as 'powder, particles or granules', with seeds that might be 'peanuts, cocoa beans, almonds, coconuts or pistachio nuts' and a protein source that could include 'skimmed milk, powdered yoghurt or whey, and/or at least one product which provides carbohydrates, particularly carbohydrate bulking agents, sucrose, glucose, fructose, skimmed milk, whey, or flour made of maize, wheat, millet, oats, rice, cassava or potato starch'.

²⁰ This is an abbreviation of 'Plumpy'nut in the Field' and it is also trademarked. Nutriset, which has remained a small, family run outfit, has always devoted some of its profits to tackling malnutrition. The company claims that it is never involved in artificially inflating the price of this product, and it claims that 70-80% of the cost of the product is the cost of commodities, particularly dried skim milk. The second largest cost is the labour to run the factories. See www.nutriset.fr.

²¹ The argument that local production could contribute to local development was based on the idea that, in the case of a franchise, producers source most ingredients from the local area, with Nutriset only exporting the vitamin premix to add to those commodities that make up the bulk of the peanut paste. Nutriset adopted the slogan 'nutritional autonomy for all' to capture this commitment to development and local production, which was defined, rather clumsily, as 'the capacity of a country or community to set up a sustainable system to identify and make accessible the nutrients required for the development and good health of its population'. Given the critique that subsequently emerged from the Indian Right to Food Movement, it is particularly interesting that 'nutritional autonomy' has similar but subtly different overtones to 'food sovereignty'. The first concerns autonomy (an individualized notion of freedom from external control) whereas the second concerns sovereignty (a collective notion, concerning the power to shape communal affairs). The first uses an etic term – nutrients – universally applicable and emerging from specialist expertise. The latter allows for emic

understandings, which may be determined by local cultures, customs, and beliefs. Food sovereignty, as defined in the Declaration of Nyéléni, is ‘the right of peoples to define their own food and agriculture’. See https://nyeleni.org/DOWNLOADS/Nyelni_EN.pdf (last accessed 10 November 2017).

²² See <http://www.nutriset.fr/en/access/patents-for-development/online-patent-usage-agreement> for the full list of current conditions attached to the patent usage agreement (last accessed 24 June 2017).

References

- Agier M (2011) *Managing the Undesirables: Refugee Camps and Humanitarian Government*. Cambridge: Polity.
- Akrich M (1992) The de-scription of technical objects. On Bijker W and Law J (eds), *Shaping Technology/Building Society: Studies in Sociotechnical Change*. Cambridge: MIT Press, 205–224.
- Autesserre S (2014) *Peaceland: Conflict Resolution and the Everyday Politics of International Intervention*. London: Cambridge University Press.
- Barnett M (2011) *Empire of Humanity: A History of Humanitarianism*. Ithaca: Cornell University Press.
- BBC News (2010) Legal fight over Plumpy'nut, the hunger wonder-product. *BBC News*, 8 April. Available at: <http://news.bbc.co.uk/2/hi/europe/8610427.stm> (accessed 7 Nov. 2017).
- Beisel U and Tillmann S (2012) Provincialising waste: The transformation of ambulance car 7/83–2 to Tro-Tro Dr. Jesus. *Environment and Planning D: Society and Space* 30(4): 639–654.
- Birkeland N, Vermeulen E and Vågli T (2004) *Camp Management Toolkit*. Oslo: Norwegian Refugee Council.
- Briend A (2013) 10 Years of CMAM: What did we learn and what are the remaining challenges? [Presentation slides]. Available at: <http://slideplayer.com/slide/7756521/>
- Briend A and Collins S (2010) Therapeutic nutrition for children with severe acute malnutrition: Summary of African experience. *Indian Pediatrics* 47(8): 655–659.
- Briend A, Lacsala R, Prudhon C, et al. (1999) Ready-to-use therapeutic food for treatment of marasmus. *The Lancet* 353(9166): 1767–1768.
- Bulley D (2014) Inside the tent: Community and government in refugee camps. *Security Dialogue* 45(1): 63–80.
- Burke T (1996) *Lifebuoy Men, Lux Women: Commodification, Consumption, and Cleanliness in Modern Zimbabwe*. Durham: Duke University Press.
- Chaparro CM and Dewey KG (2010) Use of lipid-based nutrient supplements (LNS) to improve the nutrient adequacy of general food distribution rations for vulnerable sub-groups in emergency settings. *Maternal & Child Nutrition* 6: 1–69.
- Ciliberto, MA, Sandige H, Ndekha MJ, et al. (2005) Comparison of home-based therapy with ready-to-use therapeutic food with standard therapy in the treatment of malnourished Malawian children: A controlled, clinical effectiveness trial. *The American Journal of Clinical Nutrition* 81(4): 864–870.

- Collins S, Dent N, Binns P, et al. (2006) Management of severe acute malnutrition in children. *The Lancet* 368(9551): 1992–2000.
- Collins S and Sadler K (2002) Outpatient care for severely malnourished children in emergency relief programmes: a retrospective cohort study. *The Lancet* 360(9348): 1824–1830.
- Cross J and Street A (2009) Anthropology at the bottom of the pyramid. *Anthropology Today* 25(4): 4–9.
- de Laet M and Mol A (2000) The Zimbabwe Bush Pump: Mechanics of a fluid technology. *Social Studies of Science* 30(2): 225–263.
- Diop EHI, Dossou NI, Ndour MM, et al. (2003) Comparison of the efficacy of a solid ready-to-use food and a liquid, milk-based diet for the rehabilitation of severely malnourished children: a randomized trial. *The American Journal of Clinical Nutrition* 78(2): 302–307.
- Doyon S (2011) India: The expert and the militant. In Magone C, Neuman M and Weissman F (eds) *Humanitarian Negotiations Revealed: The MSF Experience*. London: Hurst, 147–160.
- Duffield M (2012) Challenging environments: Danger, resilience and the aid industry. *Security Dialogue* 43(5): 475–492.
- Elyachar J (2012) Next practices: Knowledge, infrastructure, and public goods at the bottom of the pyramid. *Public Culture* 24(1 66): 109–129.
- Enserink M (2008) The peanut butter debate. *Science* 322(5898): 36–38.
- Fuller E (1956) *She Championed Children: The Story of Eglantyne Jebb*. London: Save the Children Fund.
- Golden M (1998) Oedematous malnutrition. *British Medical Bulletin* 54(2): 433–444.
- Golden M (2002) The development of concepts of malnutrition. *Journal of Nutrition* 132(7): 2117S–2122S.
- Harrell-Bond B (1986) *Imposing Aid: Emergency Assistance to Refugees*. Oxford: Oxford University Press.
- Harvey P, Baghri S and Reed B (2002) *Emergency Sanitation: Assessment and Programme Design*. Loughborough: Wedc.
- Horst C (2006) *Transnational Nomads: How Somalis Cope with Refugee Life in the Dadaab Camps of Kenya*. Oxford: Berghahn.
- Hyndman J (2000) *Managing Displacement: Refugees and the Politics of Humanitarianism*. Minneapolis: University of Minnesota Press.

- IRIN News (2007) Birthplace of a nutrition revolution – a blender in Malawi. *IRIN News*, 22 June. Available at: <http://www.irinnews.org/news/2007/06/22/birthplace-nutrition-revolution-blender-malawi> (accessed 7 Nov. 2017).
- IRIN News (2009) Making peanut butter gets stickier. *IRIN News*, 11 Nov. Available at: <http://www.irinnews.org/news/2009/11/11/making-peanut-butter-gets-stickier> (accessed 7 Nov. 2017).
- IRIN News (2010) Plumpy'nut patent under pressure. *IRIN News*, 12 Jan. Available at: <http://www.irinnews.org/news/2010/01/12/plumpynut-patent-under-pressure> (accessed 7 Nov. 2017).
- Jacobsen K (2015) *The Politics of Humanitarian Technology: Good Intentions, Unintended Consequences and Insecurity*. Abingdon: Routledge.
- Jézéquel J-H (2015) Staging a "Medical Coup"? Médecins Sans Frontières and the 2005 food crisis in Niger. In Abramowitz SA and Panter-Brick C (eds) *Medical Humanitarianism: Ethnographies of Practice*. Philadelphia: University of Pennsylvania Press, 119–136.
- Larner W and Walters W (eds) (2004) *Global Governmentality: Governing International Spaces*. London: Routledge.
- Latour B (1990) Drawing things together. In Lynch M and Woolgar S (eds) *Representation in Scientific Practice*. Cambridge: MIT Press, 19–68.
- Linneman Z, Matilsky D, Ndekha M, et al. (2007) A large-scale operational study of home-based therapy with ready-to-use therapeutic food in childhood malnutrition in Malawi. *Maternal & Child Nutrition* 3(3): 206–215.
- Malkki L (1996) Speechless emissaries: Refugees, humanitarianism, and dehistoricization. *Cultural Anthropology* 11(3): 377–404.
- Manary MJ, Ndekeha MJ, Ashorn P, et al. (2004) Home based therapy for severe malnutrition with ready-to-use food. *Archives of Disease in Childhood* 89(6): 557–561.
- Peteet JM (2005) *Landscape of Hope and Despair: Palestinian Refugee Camps*. Philadelphia: University of Pennsylvania Press.
- Redfield P (2005) Doctors, borders, and life in crisis. *Cultural Anthropology* 20(3): 328–361.
- Redfield P (2006) A less modest witness: collective advocacy and motivated truth in a medical humanitarian movement. *American Ethnologist* 33(1): 3–26.
- Redfield P (2012) Bioexpectations: Life technologies as humanitarian goods. *Public Culture* 24(1): 157–184.
- Redfield P (2013) *Life in Crisis: The Ethical Journey of Doctors Without Borders*. London: University of California Press.

- Redfield P (2016) Fluid technologies: The bush pump, the LifeStraw® and microworlds of humanitarian design. *Social Studies of Science* 46(2): 159–183.
- Rice A (2010) The peanut solution. *New York Times*, 5 September.
- Sanyal R (2011) Squatting in camps: Building and insurgency in spaces of refuge. *Urban Studies* 48(5): 877–890.
- Scott-Smith, T (2013) The fetishism of humanitarian objects and the management of malnutrition in emergencies. *Third World Quarterly* 34(5): 913–928.
- Scott-Smith, T (2015a) Beyond the ‘raw’ and the ‘cooked’: A history of fortified blended foods. *Disasters* 39(s2): s244–s260.
- Scott-Smith, T (2015b) Control and biopower in contemporary humanitarian aid: The case of supplementary feeding. *Journal of Refugee Studies* 28(1): 21–37.
- Scott-Smith, T (2016) Humanitarian neophilia: The ‘innovation turn’ and its implications. *Third World Quarterly*: 1–23.
- Stellmach D (2016) Coordination in crisis: The practice of medical humanitarian emergency. D.Phil thesis, School of Anthropology and Museum Ethnography: University of Oxford.
- Tsing AL (2005) *Friction: An Ethnography of Global Connection*. Princeton: Princeton University Press.
- Turner S (2005) Suspended spaces: contesting sovereignties in a refugee camp. In: Hansen TB and Stepputat F (eds) *Sovereign Bodies: Citizens, Migrants, and States in the Postcolonial World*. Princeton: Princeton University Press, 312–332.
- Vogel C (2014) Review of peaceland: Conflict resolution and the everyday politics of international intervention – by Séverine Autesserre. Available at: <http://africanarguments.org/2014/09/25/review-peaceland-conflict-resolution-and-the-everyday-politics-of-international-intervention-by-severine-autesserre/>
- Waterlow J (1992) *Protein-Energy Malnutrition*. London: Edward Arnold.
- Whyte SR, van der Geest S and Hardon A (2002) *Social Lives of Medicines*. London: Cambridge University Press.
- Wines, M (2005) Hope for hungry children, arriving in a foil packet. *New York Times*, 8 August.
- Woolgar S (1991) Configuring the user: the case of usability trials. In: Law J (ed) *A Sociology of Monsters: Essays on Power, Technology and Domination*. London: Routledge, 58–99.
- World Food Programme (2001) *Food and Nutrition Handbook*. Rome: WFP.

World Health Organization (2000) *The Management of Nutrition in Major Emergencies*. Geneva: WHO.

World Health Organization (2007) Community-based management of acute malnutrition: A joint statement by the World Health Organization, the World Food Programme, the United Nations System Standing Committee on Nutrition, and the United Nations Children's Fund. Available at: www.who.int/nutrition/topics/statement_commbased_malnutrition (accessed 26 June 2017).

Author biography

Tom Scott-Smith is Associate Professor of Refugee Studies and Forced Migration at the University of Oxford. He is a specialist in the ethnographic and historical study of humanitarian relief and is currently finishing a book on the history of emergency nutrition.