

The Mosquito Multiple: malaria and market-based initiatives

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Abstract

This chapter focuses on attempts to introduce a market to stimulate competition and generate creativity in the field of malaria vaccines. The chapter draws on a qualitative research project engaging 34 organisations in the malaria field. It is argued that those involved in attempts to produce a malaria vaccine market continually work to manage a tension between apparent ontological singularity in market framing (that the nature of things are settled and well known) and multiplicity in market experimentation (in which the nature of things appears to become messy, unsettled, subject to new questions and assessment). Entities involved in such ontological tension include, but are not limited to: mosquitoes, doctors, the sick, malaria parasites, costs, values, efficacy rates and partnerships. In the research this tension is noted by economists, scientists and policy makers. However, in place of any counter expectation that such tension should lead to critique or even abandonment of the market as a focus for managing malaria, the Market (broadly construed) continues to be heralded as the means to solve the problem of malaria. Retaining the integrity of the Market depends on upholding (and where necessary adjusting) a set of Market principles from which any particular market intervention can be judged. The failure of a market intervention is thus understood as

stemming from its inability to match the principles of the Market. The separation of the Market (as principles) from the market (as failed intervention) involves a discursive-based specificity move that prevents failure discussions being scaled up from the particular to the general.

Introduction

This chapter offers an analysis of the challenges posed by market interventions in malaria. Attempts to introduce a market for malaria vaccines are held centre stage. Through this focus, the chapter engages with a central theme of this collection: the co-ordination of different forms of value. Co-ordination work, we will suggest, is focused around the notion of market value. We will explore the creation of a \$3b value for a malaria vaccine market and ask: where did this value emerge from, how and with what consequence? We will suggest that market values are assessed in terms of their general properties, linking otherwise disconnected entities, and raising questions of the ontology of newly connected people and things. However, we will also argue that market values are understood through their particularities, their trouble-making disruptions, their role in generating disconnection and dissonance. Hence we will explore the \$3b market value as a focal point for the co-ordination, articulation and disruption of generals and particulars. The chapter will begin by engaging with the general and the particular, before analysing the specific details of market interventions in malaria.

The General and the Particular

Scholars within STS have recently turned attention toward matters of organisation and business (for an introduction, see Woolgar et al, 2009). Within these moves, markets have formed a clear focal point (see for example, Callon, 1998; MacKenzie et al, 2007; Muniesa et al, 2007). These studies have been used to suggest that markets can be conceived as heterogeneous assemblages, through which values, externalities, connections, prices and consumption (amongst many other activities) are accomplished and co-ordinated. This draws on a history of STS research which suggests that, for example, technologies can be usefully and provocatively conceived as assemblages (see for example, Latour, 2005), that scientific knowledge can be understood as constructed (for example, Latour and Woolgar, 1979) and that ontology can be addressed as multiple (Mol, 2002).

Allied to these moves into markets have been attempts to engage with marketing (Cochoy, 2009; Araujo, Finch and Kjellberg, 2010; Simakova, 2012), accounts and accounting (Law, 1996; Hopwood 2009; Skaerbaek, 2009), forms of value and valuation (Sjogren and Helgesson, 2007; Muniesa, 2012; Beunza et al, 2006). This treatment of value and valuation upholds many of the same analytic principles as the STS move to markets. Hence value can be thought through in terms of constructive processes, assemblages and, importantly for our chapter, as a focal point for both the tense, disruptive and provocative untangling and co-ordination¹ of ontological multiplicity. Following the latter line of argument, assemblages can be understood as featuring unstable associations of ontologically unstable entities (with the mutual instability providing further bases for on-going uncertainty). Constituting assemblages

¹ By co-ordination we understand not only decision-making, strategizing and evaluation of market initiatives accomplished by participants, but also the role materiality – in the sense of market devices (as in Callon, Millo and Muniesa, eds., 2007) – plays in establishing and contesting ontological multiplicity and value matters in market assemblages.

involves work which draws together and co-ordinates (e.g. through commensuration) incompatible renditions ('versions') of the 'same' thing with distinct values (as e.g. in Sjogren and Helgesson, 2007). Assembly work thus can be understood as drawing together and co-ordinating the means to render distinct things of the same value (for example, stocks in distinct companies could share the same price) or provide a basis for assessing the equivalence of distinct things through a singular line of value from which comparisons can be drawn (for example, in carbon trading mechanisms; MacKenzie, 2009).

However, STS research has not held exclusive sway on these matters of value. From economic sociology (broadly construed²) authors such as Boltanski and Thevenot (2006) draw on vocabularies resonant with the STS turn to markets and the economic (for more on this, see Guggenheim and Potthast, 2011). Hence we find a pursuit of people and things and associated analyses of symmetry; we find a focus on qualification; investigations of associations; and we find a focus on the construction of value as worlds of worth. Boltanski and Thevenot also place great emphasis on distinctions of worlds, regimes and forms of value.

We could take these similarities as one focal point for value-laden co-ordination work. However, we also find many distinctions between the approaches. For example, could the work of Boltanski and Thevenot be said to provide an alternate take on multiplicity in comparison to Mol (2002); a varied grammar of description and analysis? If Mol's take on multiplicity can be summarized as a concern with distributed praxis through which ontologies are accomplished, Boltanski and Thevenot's work could perhaps be understood as providing an ontology of values through their grammars of worth.

² For a more detailed discussion of the conversation between economic sociology and STS see collection *Living in a Material World: economic sociology meets science and technology studies* edited by Pinch and Swedberg (2008).

Two salient points emerge from the work of Boltanski and Thevenot for this chapter. First, these “worlds of worth” are not singular nor do they necessarily involve the assemblage of entities into comfortable agglomerations: much of Boltanski and Thevenot’s work is dedicated to an investigation of particular problematics that arise through these forms of worth. Second, for these authors a central feature of the move to count, value, justify and place worth on some person or thing, is to move between the particular and the general. However, there is no guarantee of smooth passage between particular and general. For example, particular problematic instances have to be explained in such terms that accommodations can be made by general principles or, more frequently, problematic particulars have to be cast out from generals in order to pay recognition to the higher value of generals, maintaining the latter’s aggregate integrity. For our focus on value-laden coordination work, the general and the particular might be taken as a focal point for tension.

More precisely, this suggests that if we are to further explore STS ideas on values in market based interventions made into the field of malaria, we could usefully explore the coordination practices which accomplish values and valuation and moves between the general and the particular. In order to understand values this chapter will ask: how do participants in market based interventions move from the particular to the general and vice versa and how do they act to protect market principles (generals) from troublemakers (ill fitting particulars)?

To address this question, we will engage with the work of Lee (1999) on the general and the particular. Lee (1999) investigates policies relating to children and explores the complex position of children in social order. They are understood in universal terms at times, as specifically different or unique on occasions, they are given responsibility in specific circumstances and there are those individuals and institutions that in other circumstances are called upon to speak on behalf of and take responsibility for children. Lee suggests that policy interventions, such as Article 12 of the UN Convention on the Rights of Children,

engage many of these issues simultaneously. It is both potentially toothless and profound, and importantly for our chapter, it attempts to operate in general and particular ways. Lee argues:

“It offers the most general provision for children that is possible. In order to provide for all children, however, its provisions must be seen to be capable of covering the case of each particular child. Abstract principles are all well and good, but unless they are seen to be applicable they can scarcely amount to a policy directive. The authors of Article 12, then, had to find a way for the general and particular to meet each other on the page,” (1999: 457).

It is often suggested that such policy interventions talk on behalf of particular populations (in this chapter sick and potentially sick populations of malaria sufferers), that they distribute forms of responsibility and accountability (Neyland, 2012). We propose to engage with the ways in which such policy interventions through their focus on forms of value and valuation, draw together on the same page notions of the general and particular. Hence we will explore how attempts to introduce markets, for example, invoke motifs of the general (that firms will pursue profit, will pursue higher returns, that these are universal conditions which underpin the actions of firms and their pursuit of value, that value is characterized by economic gain). At the same time we will analyse the ways in which attempts to introduce markets are also drawn into the details of the particular (relating to specific pharmaceutical firms, the particular details of research and development projects, the complexities of intervening in particular diseases in particular countries or regions).

This suggests that value-laden co-ordination work can be envisaged through policy interventions and invocations of value. These might be thought of as bringing into being general ontological statements regarding the nature of value, the nature of business, the nature of disease, while also being engaged with the particularities of specific disease

problems. However, we will also look to go beyond this singular directionality, moving from the general to the particular. We will also investigate the work done in and around particular policy interventions to attempt to prevent the particular from shifting to the general. We will argue in the empirical material presented in the following sections, that a discursive specificity move can be seen to be made to prevent particulars becoming generals in certain situations.³

Market Based Interventions in Malaria

Those working to intervene in malaria are said to be engaging with a complex field. First, it has become a familiar argument that only 10% of global medical research is devoted to conditions which account for 90% of the world's disease burden (POST, 2005; DNDi, 2006). In this sense, malaria is a disease outside of conventions for understanding economic value; it is a disease without a profitable market. Second, treatment usage is said to be ineffective, interventions in some geographical areas non-existent and knowledge of diseases limited (WHO, 2008; POST, 2005). Hence malaria is positioned as one in a group of diseases characterized by uncertain medical 'expertise', treatment or intervention. Third, the scale of malaria is understood as both significant (in the size of the population of sufferers, the cost and geographical spread; Bayer, 2006; VOA, 2005; National Geographic, 2007; Gates Malaria Partnership, 2006; GSK, 2005) and uncertain (for example, with estimates of death

³ The research for this chapter draws on interviews carried out over a two year period with 34 organisations involved in various kinds of interventions in malaria. These organisations included governmental agencies at national and international level, a large pharmaceutical firm, several philanthropic organisations, University scientists and economists with an interest in malaria. Interviews were analysed to investigate the ways in which participants discursively accomplished positions for various malaria entities. This methodology drew inspiration from ethnomethodology (Lynch, 1998; Goodwin, 1994).

rates shifting between 1 million and 2 million per year; National Geographic, 2007). Fourth, scientific accounts of malaria also shift between certainty⁴ and uncertainty⁵ (National Geographic, 2007; VOA, 2005).

Among these uncertainties, vaccines for malaria have been heralded as a way forward. Although interventions in sub-Saharan Africa have included educational initiatives (for example based on promoting the use of bed nets), malaria management drives (through, for example, attempts to reduce mosquito populations) and malaria treatment (through the provision of medicines to people who have developed malaria), vaccine development programmes (co-ordinated by, for example, the Malaria Vaccine Initiative, a public private partnership involving Gates Foundation funding, GSK⁶ pharmaceuticals and University researchers amongst others) currently attract the most research funding (Global Health Program, 2011). The story of vaccines narrated by vaccinologists is compelling; the single dose, delivered swiftly, which provides life-long protection and may even eradicate malaria (by cutting the lifecycle of the disease). Hence uncertainties might be cut regarding the delivery of treatment (if a vaccine was developed it might be deliverable in a single dose), scale (it might work for everyone) and science (the cycles of malaria might be cut).

Although compelling, if not seductive, this narration has introduced two key questions into the field of malaria. How might the first uncertainty (detailed above) of malaria's position outside the conventions for markets, profits and the accrual of economic value be addressed? Furthermore, to what extent can the vaccinologists' narration of vaccine certainty be accomplished?

⁴ With a focus on the cyclical nature of mosquito bites, sporozoites entering and multiplying in the blood, being picked up by other mosquitoes, and entering other bodies leading to fever, vomiting, coma and sometimes death

⁵ In understanding the relationships between blood cells, immunity, brains, parasites, mosquitoes and their feeding habits

⁶ GlaxoSmithKline

Malaria and Market Devices

One means of explaining the on-going absence of a malaria vaccine has been offered by Harvard economists (Glennerster, Kremer and Williams, 20006). They suggest that the market for malaria is economically unattractive and needs to be made more alluring. In order to achieve that, various market devices have been proposed and evaluated as part of co-ordination work to achieve market value. For example, Glennerster, Kremer and Williams (2006) suggest that a malaria vaccine market could be constructed through Advanced Market Commitments (AMCs) or Advanced Purchase Commitments (APCs).⁷ They argue that these would act as ‘pull factors’ to entice pharmaceutical firms into developing vaccines for otherwise less attractive (i.e. less lucrative) diseases. They suggest:

“One proposal to incentivize private sector R&D investments in products for diseases concentrated in poor countries is for sponsors (rich-country governments, private foundations, or international organizations such as the World Bank) to undertake ‘advance purchase commitments’ for desired products, such as vaccine... If no vaccine is developed, no donor funds would be spent” (2006: 67). They argue that this approach is cost effective, involving an outlay of \$15 per life year saved.⁸

The first AMC/APC has been recently launched for pneumococcal vaccines.⁹ Discussions continue to focus on launching a malaria equivalent. This would involve European member states, the World Bank and the Gates Foundation, under the management of the Global Alliance for Vaccines and Immunisation (GAVI). According to Glennerster, Kremer and

⁷ In some cases APCs have a slightly different emphasis in comparison with Advanced Market Commitments (AMCs). The former are focused on putting in place an agreement to purchase a near-market product, the latter involve producing an agreement to purchase a theoretical future product once available, effectively (attempting to) stimulate general market competition to produce such a product. However, on occasions in the literature, the terms APCs and AMCs seem to be used interchangeably.

⁸ Economists suggest that developing country populations are usually considered good value anything up to \$100 per life year. Glennerster, Kremer and Williams (2006) argue that: “the US cost-effectiveness threshold is estimated to be as high as \$50,000 to \$100,000 per life-year saved,” (2006: 74).

⁹ See: <http://www.gavialliance.org/funding/pneumococcal-amc/>

Williams (2006) the details of the AMC/APC would operate as follows: a group of credible sponsors would provide a legal contract, which sets out the total potential market for a vaccine. The value which has been placed on such a market is \$3b. The sponsors would then underwrite a price (around \$15 per dose). This price would be guaranteed for a certain number of doses (up to a total cost of \$3b). Countries that would be eligible would also be established at this stage. After this fixed price, the developer (who will have covered their costs by this point) must then guarantee to sell doses at a cheaper price (say \$1 per dose). Sponsors would pay more than recipient countries of the initial \$15 dose (say \$14 and \$1 respectively). Subsequent vaccines would also be eligible for guaranteed price; if a better product comes to market, recipients could switch to another product. The proposal suggests an independent adjudication committee oversees the agreement.

Various principles, which we will term ‘generals’ and ‘particulars’, emerge through the AMC/APC proposition. We will begin with the generals. First, there is a general principle that private sector firms will be incentivized by a commitment to receive financial return and that a value (in this case \$3b) can stimulate action. Second, there is the prioritising of a vaccine as a general good. Third, cost effectiveness is drawn to centre stage as a principle means for adjudging value. Each of these generals is predicated upon ontological certainty regarding the nature of private sector firms, the benefits of a vaccine and what constitutes cost effectiveness. Certainty resides in the ability of generals to talk on behalf of their populations, thereby implicating the importance of audiences (imaginary, real, specific) for the practices of articulating value, or valuation. However, as the following interviewee suggests, incentives for private sector firms may be more complex than this initial proposal suggests.

Interviewee 9 (UK government agency)

My own personal opinion is that people haven't thought through enough who the AMC is aimed at. I mean I think on paper the AMC is a really interesting idea but we need to have a more detailed analysis of who will actually respond to developing potential vaccine candidates for neglected diseases and very often that's smaller biotech companies rather than big pharma so the incentives of an AMC are in the wrong time-scales for bio-techs and my view ... – the timescales of AMCs is missing the most innovative part of the industry. I've talked to bio-techs and they're trying to take things forward more quickly than big pharma so we need a more nuanced approach more than just we'll promise to buy all this in 20 years time. We need intermediate milestones which will give the right incentives to the right companies at the right time in development.

For this interviewee the general and the particular cannot sit side by side on the same page and indeed the particulars (of biotechs) question the generals (of a singular model of firms each operating to the same time scale). The ontological certainties of general propositions (that private sector firms operate to a singular temporality), appear to be placed under scrutiny by specific particulars (a broader range of private sector firms, with distinct time frames) that by necessity must be cast out from the unified aggregate category of the general in order for that category to make sense. The smooth ontology narrated for the private sector within the AMC/APC proposal slips away through this interviewee's discussion of the particulars of biotechs. The passage from particular back to general is cut; the general no longer talks on behalf of its assumed population of particulars. In a similar manner, the following interviewee response can be understood as questioning the general principle that private sector firms in this field were profit seeking:

Interviewee 14 (Neglected disease consultant)

...one firm actually said to us if there was a profit in this we would leave, because what we're getting out of it now is the good guy benefit, and if we're making money we don't get that and it's not worth it, we just go back to blood pressure. So I think it was very, very clear that they wanted to partner, it wasn't about profits and the incentives were set wrong.

...it's funny, because when the economists reviewed our work they said it's, the funniest thing is that governments appear to be, there's a lot of not-for-profit activity being done by companies in the drug field and governments are now trying to monetise it in a sense, and move them to doing it for-profit what they now do not-for-profit, and it's really hard to see why you would do that.

The general principle of profit seeking in the private sector is disrupted by this interviewee through the particular features of pharmaceutical activity in the field of malaria. Rather than entering that field for profit, the interviewee suggests firms are attempting to disavow their status as ruthless profit seekers by working for free. However, with the emergence of AMCs/APCs they are now placed under pressure to contractually agree to receive income – a percentage of the \$3b market value. According to this interviewee the value of involvement for large pharmaceutical firms is not profit, but reputation and corporate responsibility, an attempt to generate ethical rather than financial value. The general principle of value through profit in this instance appears directly opposed to the particular principles sought of ethical value through non-profit. The smooth aggregate ontology of private sector firms built into the AMC/APC proposal is disrupted once again; not only are private sector firms in this field divisible into distinct particulars (large pharmaceutical firms and smaller biotechs) they are also divisible by the field into which they are entering (seeking profits through blood pressure and ethical standing through malaria). The particulars in these excerpts could be said to generate dissonance in the smooth aggregate generals of the AMC/APC agreement. These

particulars directly question the ability of generals to talk on behalf of their populations and go some way to casting these particulars out from generals.

The AMC/APC proposal can aptly be described as a market device producing generals and particulars. Through the scheme, further generals emerge; that a market can be valued, that contracts can bind values, that dosage prices can be used to calculate values and that values can be governed through a committee. These generals also sit on the same page as particulars; a specific market value (\$3b), a dosage price (\$15) and a division of cost (between donors and recipient governments). Within the AMC/APC model the relationship between these generals and particulars appears unproblematic. The twin logics of value invoked of economy and health appear comfortably intertwined. However, this comfort is based once again on ontological certainty. Interviewees were swift to point out tension between the ontological certainty of generals and problems with these specific particulars. Although interviewees did not suggest that placing a value on a market was problematic as a general principle, they did seek to raise questions of the particular valuation of \$3b. The following interviewee suggests that the incentives supposedly made available by a \$3b evaluation are misleadingly straightforward:

Interviewee 10 (UK based senior vaccine scientist)

...the idea behind the Gordon Brown initiatives¹⁰ is that if you put a big enough pot of gold at the end of the rainbow that suddenly private companies will invest in these diseases...that's an untested idea. The initial problem with it is... by and large vaccines are made by very very very big companies. 80% of the world vaccines are sold by six companies. These companies are interested in products that earn at least a billion dollars a year, not a third of a billion dollars a year, and the malaria vaccine

¹⁰ Although the AMC/APC model was devised by US economists, a strong advocate for this model was Gordon Brown initially in his role as Chancellor of the Exchequer and then in his subsequent role as UK Prime Minister.

and TB vaccine might hit peak sale of half a billion a year. But by and large they are under the threshold. They're not blockbusters.

This interviewee uses the term 'blockbuster' as a means to generate a distinction between compelling and not so compelling financial evaluations (for more on compelling market relations, see Simakova and Neyland, 2008). For this interviewee malaria vaccines would remain on the non-compelling side of this division even with an AMC/APC in place. In the preceding excerpt the ontology of valuation (that a monetary figure could be placed on a market and this will compel action) was disrupted through calling upon further valuations as comparative metrics to prove the absence of allure in \$3b. Further questions were asked by interviewees of the specific consequences stemming from a \$3b valuation of a malaria market:

Interviewee 9 (UK government agency)

If you've got a guaranteed market for something which is good enough but not very good what's the incentive for making something really good?

For this interviewee the smooth certainty of the AMC/APC principles was drawn into question through future uncertainties; what would happen if one 'good enough but not very good' vaccine was tied into a contract and received most of the funding? Would others compete to try and take that contract away, who would decide on which vaccine was good enough to receive a contract, would disputes be handled by the AMC/APC arbitration committee, would they be lobbied by firms seeking funding for their vaccines? Responsibility for ontological certainty remained an unanswered question.

Vaccine Certainty

Further questions were raised by interviewees regarding the compelling certainty of vaccines narrated by vaccinologists. At the centre of attempts to build a \$3b market value for malaria vaccines, was certainty that a vaccine would be produced that would work. Uncertainty among interviewees was mirrored in the broader malaria literature with discussion over 20 years of the immanence of a vaccine (see Turnbull, 1989) and suggestions made that a vaccine against a parasitic disease has never been successfully accomplished. (VOA, 2005). The compelling certainty of malaria vaccines (that vaccines could be developed and delivered in a single dose, providing life-long protection) may still prove elusive (Neyland, 2012). However much of the proposed market based intervention into malaria is based on this problematic but seductive certainty; the AMC/APC model appears to depend on the notion that a successful malaria vaccine could be developed in response to the financial stimulus of the \$3b model. Many of the interviewees in this research swiftly moved to question the status of the current leading malaria vaccine candidate and its future efficacy:

Interviewee 2 (Senior neglected disease scientist)

I see malaria vaccine as taking money away from areas that we know work to something which is entirely speculative. I'm just a bit cautious about that... It's a really serious issue.... [The current leading malaria vaccine candidate] will never achieve anything at all in Africa.

Interviewee 3 (US government agency)

We also know, based on the ... experience [of the current leading malaria vaccine candidate], that here you have a novel synthetic vaccine that gives you at least partial immunity and so, you know, if you take all of these things together, I think that the overwhelming impression is that technically it should be feasible to come up with a malaria vaccine.

In these excerpts we can note that the seductive general certainty of vaccines – that they can be delivered in a single dose and provide lifelong protection – both underpins the value in the AMC/APC model, but is also characterized by an uncertainty that varies amongst interviewees. Is the current leading vaccine candidate effective enough? Is it effective for the general population, or for those groups particularly susceptible to malaria (such as children under 5 or pregnant women)? For how long would it be effective if parasites were able to continue to mutate in the human body in response to contact with the vaccinated body? Cost-effectiveness in the AMC/APC model is also predicated on the seductive narration of vaccine certainty. Cost effectiveness is pushed to the fore as a general basis for adjudging value in the AMC/APC model, but is simultaneously undermined by the on-going uncertainty of vaccine development. If it turns out, for example, as many predict (VOA, 2005) that parasites will evolve in the human body in response to vaccines, rendering long term judgements of the efficacy of a vaccine impossible, this on-going ontological uncertainty would invalidate values produced through cost effectiveness judgements. These initial generals appear to derive their aggregate integrity and ability to talk on behalf of populations (such as the private sector) and values (such as cost effectiveness) from a problematic ontological certainty premised on the notion that the aggregates (such as private sector firms, vaccines and cost effectiveness) on behalf of which they speak are coherent and singular.

Further adding to these uncertainties, the following interviewee raised questions of the notion of scientific innovation designed into the AMC/APC model. When asked why she thought advocates of the AMC/APC thought a market based intervention would stimulate scientific discovery, she answered in the following manner:

Interviewee 14 (Neglected disease consultant)

I think largely because it was designed in the US and they have a strong pro-market preference, so all their incentives start with we need to make a market, because that will stimulate people. But in practice, I always say to them are there a lot of people in America have colds, of course there are, there's a big market for a common cold but there's no treatment for it. Why is that? It's because for some things it's not the market, it's the problem is we don't know how to do it.

For this interviewee, the AMC/APC model was premised on a notion of innovation that featured a straightforward relationship between financial incentive and new scientific discovery, which was here rendered questionable from a practical perspective. In this excerpt, her suggestion was that innovation would not simply emerge from greater finance nor could finance determine innovation. Unlike some of the previous interview excerpts, in this instance it appeared that two generals collided. It was not the particular features of malaria that undermined the general principle of the AMC/APC model. Instead it was the general principles of this model which clashed with a further general model of innovation. The disjuncture was thus realized through the drawing together of incompatible generals.

In sum, interviewees raised questions of the ontological certainties of general principles¹¹ designed into the AMC/APC and also discussed the problematic particular features of malaria intervention. At times the general was drawn into question for its apparent aggregate but over simplified singularity (for example, in assuming that private sector firms had a singular and unifying set of characteristics), suggesting that generals did not speak on behalf of their populations. At other moments particulars were used to demonstrate a problem with the general (for example, cost effectiveness as a general mechanism of adjudging value would be undermined by on-going changes in the nature of the malaria parasite and its relationship to a

¹¹ This is reminiscent of the performance of “ontological gerrymandering” in attempts to solve social problems discussed by Woolgar and Pawluch (1985).

vaccine). On other occasions, the general was maintained as a feasible idea undermined by the particulars of malaria (for example, placing a value on a market was not critiqued as a general idea, however the specific valuation of \$3b dollars was deemed problematic). In the last excerpt, two general issues drawn together into the model were noted as incompatible.

Economists working in the field of malaria, appear to have adopted a slightly different stance. For them the general principles of market economics appear to require protection from the particularities of what they want to suggest are the startling oddities of the case of malaria. For economists the move is to try and protect general principles from particular features by preventing any scaling up or promotion of particulars to generals. For example, Farlow (2004; 2005; 2006; and with Light, Mahoney and Widdus, 2005) suggests that the AMC/APC “model for these vaccines is unworkable, inefficient, and inequitable towards the wide range of potential developers and suppliers of such vaccines.” (Farlow, Light, Mahoney and Widdus, 2005: 2). Farlow (2005) also argues that there seems to be a “set of literature that severely downplays the problematic side of APCs for early-stage vaccines, and that instead paints a picture of a ‘simple,’ ‘straightforward,’ and ‘powerful’ new tool,” (2005: 2).

Furthermore:

“The case for APCs for early-stage vaccines was not helped by the early decision to trivialize the science of... malaria vaccine development to one that is ‘linear,’ fixed, simple and static, when for early stage vaccines it is instead highly complex, and dependent on feedback loops, collaboration, and comparison of results and sharing of information,” (Farlow, 2005: 4).¹²

¹² Farlow (2005) argues that later stage vaccines require different considerations: “For currently existing and near-market vaccines, purchase commitments are all about creating stability of demand, incentives to invest in production capacity, the tailoring of an already existing product to new users, the creation of low product prices, and access to vaccines,” (2005: 3).

Furthermore Light (2010) suggests that initial *in vivo* market experiments with available vaccines for other diseases common to developing countries, have proven problematic, particularly in keeping to initially agreed prices. And Sonderholm (2010) suggests the malaria vaccine AMC overlooks the complexities of ethical issues resonant with distinct populations where the disease is prevalent.

Through this literature we can note many of the features previously highlighted by interviewees such as a difficulty in relating finance to innovation and a challenge raised by continuing uncertainty in vaccine development. We can also note some new locations for dissonance in pricing instability and ethics. However, for economists such as Farlow (2005) there is a further move to protect the general from the particular by rendering a division between economists' understanding of the Market (as general) and the AMC/APC understanding of the market (as troubling particular). In this sense, the AMC/APC principles are down scaled from generals to particulars. For Farlow, problematic particulars comprise a number of issues with AMC/APC market modelling: why would \$3b be the correct amount to stimulate interest among private firms; what steps would be introduced to prevent the first vaccine available taking most of the available fund, limiting any future innovation; how could minimum standards of quality or effectiveness for vaccines be developed; what would AMCs/APCs mean for non-eligible countries; what would be the cost of introducing and running this intervention; what would stop firms lobbying the oversight committees to get their vaccine prioritized; how would intellectual property issues be resolved?

For economists such as Farlow, critiquing the AMC/APC model involves elaborating and maintaining protectionist principles such that the Market as ultimate general retains its ascendancy. Hence the critiques of the APC/AMC neatly delineate the focal points for critique in order to protect the dignity and integrity of the Market. It is this particular model (e.g. assuming one finite pot of money will ensure continuously improved upon products),

these particular terms of value (e.g. the \$3b to be offered) and these particular assumptions about the members of the model (e.g. that science is relatively straightforward or that pharmaceutical firms are primarily involved with malaria for financial reasons) that are drawn out for critique. It is these particulars which are utilized to argue that the model does not and cannot be represented by the general (the Market). The particulars must be cast out and in their banishment we are given the opportunity to witness their danger; trouble making particulars which would cause unwarranted trouble for meta-economic orders of value.

Hence we can understand the work of economists such as Farlow as an attempt to disaggregate the co-ordination work of the AMC/APC model. In place of a series of co-ordinated efforts to constitute values in the field of malaria vaccination, the economist's practice here is oriented toward bringing particulars to the fore in an attempt to undermine the value of the proposed generals. Value practices here are oriented toward defending the value of economists' general models of the Market which are deemed endangered by the crass particulars of this AMC/APC model. The AMC/APC model is positioned as undermining the valued Market modelling practices of the economist. Although practices might be understood as constituting values, and alternative practices might be understood as undermining or questioning values, we can also note here efforts to protect long held and valued economic practices for talking on behalf of the Market.

Conclusion

This chapter has featured an analysis of attempts to generate a market for malaria vaccines. The chapter has dealt mostly with particulars, including the specificities of malaria, parasites

and AMC/APC proposals. To summarise our value-laden co-ordination work, we have decided to end with some general comments about particulars and some particular comments about generals. First, it seems to us that the ontological certainty of statements calling for market-based interventions is of broader prevalence than the field of malaria vaccines. Engaging with the tension generated between ontologically bold propositions (generals) and the details of managing interventions (particulars), appears of broader interest and perhaps provides a route to be further explored. Attempts to situate generals and particulars on the same page seemed to us a central feature of the co-ordination work of value-laden practices in our study of malaria vaccines. Second, our analysis of malaria suggests that values and practices of valuation could be usefully further explored as moments where particular forms of trouble are generated for generals. The modes of policing of such troubling particulars also provide further routes through which to raise questions of value. In our study the co-ordination work that went into the production of the AMC/APC model was continually placed under the spotlight by suggestions that the particulars of malaria entities undermined the generals of the model.

Third, however, the reverse also appears salient. It appears that our questioning of particulars can be inverted. In this sense, we can investigate the trouble caused by generals failing to speak on behalf of the particulars they are held to address. Generals without a constituency appear to provoke trouble of their own which perhaps could be the subject of further analyses. In our study of malaria the general principle of firms seeking profit was at times without a constituency (as firms instead sought to evade profiting from malaria at all costs in order to build a surplus of good publicity in case of bad publicity ahead). Fourth, our analysis of markets and malaria has suggested that scalar shifts between particular and general (and in critiques, between general and particular) are possible and problematic. Moves to defend against the scaling up of particulars and protectionist drives to hold particulars in their place

and to deny them a perceived higher value through the scalar accomplishment of being promoted to generals, are perhaps deserving of further research. At the end of the paper, we suggested economists themselves were seeking to operate as the appropriate body to police the trouble that may be caused to economists' practices of talking on behalf of the Market by the apparently ill-conceived up-scaling of AMC/APC particulars into Market generals.

Fifth, it seems to us that the nature of what constitutes generals and particulars could be further explored. Our analysis suggests that in testing circumstances – such as interventions in diseases like malaria – generals must be found¹³ to have sufficient ontological singularity to retain coherence and sufficient ontological fluidity to be utilized/transformed for a range of particular instances. Furthermore, particulars require focused ontological singularity which can be recognized as a coherent transformation of the general (the kind of transformation which can still be recognisably transformed back into the general) and which is not characterized by such a degree of ontological transformation that to consider it an instance of the application of a general would be to undermine the dignity, integrity and aggregate utility of the general. Our example of markets and malaria appears to fail, on occasions and through the discussions of specific participants, both the general and particular test.

These five points draw our attention to some significant market based failures, in co-ordination work, in establishing singular value, in bringing a market for a malaria vaccine into being. However, treating the idea of “failure” as a negative and undesirable result of economic initiatives appears a limited assumption, particularly when considering that failure and experimentation are frequently an integral part of economic deliberations (Neyland and Simakova, 2012). Furthermore the critiques of economic models by economists (in our case

¹³ We are using the term ‘must be found’ here as a shorthand for all that work that goes into constructing generals, e.g. advancing and defending the Market as general through e.g. mobilising economics reasoning and forms of counting, representation, reporting, legitimating and advancing particular modes of critique.

of the AMC/APC model) appear to depend upon a modification of Latour and Woolgar's (1979) splitting and inversion model of scientific facts; the 'Market' as a general concept is to be split from these particular market models and their particular details of valuation, and hence preserved in a separate space. Critique of the particular model is enabled, while the Market is preserved and reinforced through justifying the economic effectiveness of various market devices. In attempts to protect market value singularity through modelling and market devices, co-ordination work appears to be equivalent to establishing and maintaining a singular (monetary) value (e.g. \$3bn) of also a singular entity 'market for malaria' in order to make the Market work as a general. Such value is deemed crucial based on economic assumptions and calculations that would not let the going-back-and-forth between particulars and generals in as basis for analysis and proposed action. And, for the economists, their critique should not be read as undermining the Market, but inversely it ought to be seen as part of the very process of defending and extolling the Market's virtues, thus triumphing worth and value as the ultimate outcome of market work. Hence in place of any assumption that market modelling and co-ordination work could be achieved more effectively, based on better or more accurate policy analyses – in some way avoiding failure – what we conclude instead is that the tribulations of market models highlight forcefully the continuing importance placed by economists (and other participants) on recurrent work to propose, challenge and critique the 'correctness' of terms, values and assumptions directed toward stimulating a viable Market.

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