

Of Goods as Boundary Objects and the Cyborgs who Manage Them

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Abstract

We address the agenda initiated by Callon and colleagues of markets making calculation and of calculation making markets. For Callon, markets are framed as organised social spaces within which actors undertake buying and selling activities and so exchange property rights over goods, rather than thin boundaries across which actors undertake buying and selling activities as objects are transformed from worlds of production to consumption. While we are impressed by Callon's notion of spillovers, in which actors struggle to take objects and their dimensions into account and so qualify these as goods, we question whether these inherent spillovers can be stabilised within the organised social space of the market through calculating and qualifying. Instead we see spilling over into other organised social spaces, such as in the lifeworlds of production and consumption, as vital to the stabilising of the object, which we term 'the marketing object' in recognition of its multiple identities in the worlds of production and consumption as well as markets. While the marketing object acquires the status of boundary object, it also acquires the managing attentions of a cyborg marketing manager, who comes to inhabit the lifeworlds of production, market and consumption. As we extend the terrain of the marketing object, so the prospects for a unified or totalising calculus recede, to be replaced by the idiosyncratic talents and experiences of the cyborg manager.

Keywords: Markets, calculation, spillovers, boundary objects, cyborg manager

On calculation in and around markets

Michel Callon, in a series of contributions, has brought markets into the critical discourse of the broadly economic disciplines of economics, economic sociology, marketing and accountancy (Callon 1998a, 1998b, Callon et al. 2002, Callon and Muniesa 2005). Callon was uncomfortable with what he saw as an emerging tendency of sociologists to reclaim markets for their discipline in the spirit of challenging economic imperialism of these social phenomena. He drew upon some of the conceptual resources established in actor-network theory in order to argue that markets were in general performative of economic theory. Hence, *homo economicus* can, more or less, survive in markets as markets are a manifestation of economic theory. Mackenzie has developed the performative line of argument in what can be seen as the rarefied settings of derivatives markets, but has found processes of systemic atrophy as actors have imitated successful hedging strategies or option pricing formula. Cochoy (1998), Araujo (2004) and Helgesson and Kjellberg (2005) have directed marketers' attentions to what might seem more mundane settings, such as retailing and distribution, to investigate the tractability of Callon's arguments.

We are fully committed to the established ethos in marketers' developments of actor-network theory – shared by IMP scholars – such that our knowledge claims should be worked out among the mundane activities and practical theorizing of marketers' life worlds. However, in this paper we seek to take a step back from practical settings in order to raise some conceptual questions, which we feel have been ignored as researchers have focussed on Callon's positive contributions.

Our concerns are two-fold. First, markets are characterised by calculation among its actors. Indeed, markets, where established, mark a momentary transition of an object between the lifeworlds of production and consumption such that markets make calculation and calculation makes markets. Calculation in markets is about expected gains in revenues or utility, but proceeds in a way that is far from the smooth world of demand and supply schedules, which economists envisage. Products are different, but differences can be exacerbated or manipulated in order to frustrate buyers' calculations. Buyers may calculate in ways that are wholly obscure to sellers, if they calculate at all. Our concern is less with the practices of calculation than with the spillovers – another critical concept for Callon – which we see not so much as unsettling calculation practices within markets, but as fusing the lifeworlds of production and consumption much more closely with markets.

To this end Lagendijk's (2004) development of the system world and the lifeworld, drawn from Habermas (1984), provides a stimulating starting point. The three settings of our argument are production, market and consumption. In the extreme, and given a focus on markets, production and consumption could be seen as lifeworlds with markets as systems worlds. Or we could pursue Lagendijk's (2004) general position, that settings can present different mixes and proportions of lifeworld and system world at different times. We understand spillovers as being between these worlds rather than being irritants only within markets in never-ending processes of qualification and re-qualification, entangling and disentangling, and detaching and attaching, as suggested in Callon et al. (2002) and Callon and Muniesa (2005).

Related to this point, if markets are organised social spaces, and so in this sense comparable with other social spaces such as firms, they are also seen as highly devolved social settings with very flat organisational structures. This common perception is linked easily to the performativity of economics in markets. But such a view, as elaborated in the context of marketing managing by Harris and Ogbonna (2003), confines the activity of managing to the lifeworlds of production and consumption. Our second concern is thus with the marketing manager, who we see as being particularly affected by the impact of our conceptual discussion. We cast the marketing manager as cyborg manager to be able to manage effectively across radically different settings, rather than either being excluded from the market setting, or being just one of many calculating actors confined to the market setting. In short, our marketing manager is a cyborg because she engages with, interprets and acts across different settings and because she participates in processes of defining and forming boundaries as distinct from calculation within boundaries.

We organise our argument across the remaining four sections of this paper. In the following section, we review the contributions of Callon and colleagues with a particular focus on how these perform neoclassical and other traditions of economics. In Section Three, we develop a critical perspective on the activities of calculation, qualification and qualcultation. In Section Four, we argue that the marketing manager may more effectively be thought of as cyborg actor rather than a calculating or qualcultating actor. Section Five concludes.

The instability of market settings

In this section we review the contributions of Callon and others to understanding both markets and marketing. We question whether markets are shaped by the performativity of economics, especially

where Callon (1998a) represents performativity as something close to *homo economicus*. Callon develops the personas of *homo clausus* and *homo apertus* as possible inhabitants of markets, with the tension between them resolved in favour of the former. Callon (1998a) initiated market analyses in economic sociology in part as a critical response to market anthropologies, which he saw as setting out to frame and then undermine the market society as an ideological construct by reporting the distinctly non-economic conduct of actors in particular 'hot' market settings. By contrast, Callon (1998b) writes of distinct and multiple market settings. Even so, Callon's focus on calculation as the function of markets and market actors remains a matter of contention (Miller 2002). The attention has shifted from the calculations performed by human actors to calculations performed by markets themselves (Callon and Muniesa 2005), betraying the origins of Callon's markets initiative in actor network theory (Callon 1999).

We draw upon three dimensions of Callon's economic sociology of markets, which highlight its controversies and contentions: performativity, especially with respect to different economic theories; the relationship between markets and heterogeneous goods; and how spillovers from the practices of exchange perform and test a market's boundaries.

Performing economics, broadly construed

Callon's (1998a) argument is that something resembling neoclassical economics, and specifically its personification as *homo economicus*, can exist because it can be performed in or as market settings. In other words, markets are not givens of economies and societies but are constructed as actors interact while making exchanges. Markets are not essential for exchanges and so accumulations of exchanges do not also produce markets (Araujo 2004). For instance, and adopting the framing of economics, sellers' monopoly power threatens markets but exchanges still occur. The critical point, which is not developed within the framing of economics, is that markets and a subset of exchanges are shaping of one another reciprocally. We can distinguish markets from exchanges conceptually, but in practice a subset of exchanges perform markets and markets perform this subset of exchanges.

The potential for instability in markets and in exchanges is quite clear from the relation of reciprocal shaping between markets and exchanges. Loasby (1999a) explains economists' ambivalence towards markets as (implicit) assumptions that markets are natural or at least settled phenomena, which are established prior to episodes of exchange. Further, competition among well-informed actors produces commodities. Loasby counters what he sees as economists' complacency in arguing that markets are (or provide) complements in the processes of production, exchange and consumption, sometimes economic or private goods as services. Ostensibly, Loasby provides an institutional explanation of markets, by which we mean one that introduces more space/distance between 'fluid' exchange activities and markets' durable rules, routines and processes. Loasby's concern with institutions implies greater stability in markets than Callon's explanation, which is based on actions. However, Loasby's broadly evolutionary analysis has quite a lot in common with that of Callon. We can see markets as objects involved in the activities of production, exchange and consumption, much in the manner of Menger (1976). In all instances, the activities are composites (sometimes as goods, including services) in complementary relations, as are the actants of actor network theory (Latour 1987).

By arguing that markets are performed by actors, we are implying that exchanges are uncertain and markets are as prone to instability as stability. Performativity is then of critical importance, requiring us to 'understand how it is that durability is achieved. How it is that things get performed (and perform themselves) into relations that are relatively stable and stay in place' (Law 1999, p. 4). Mol (1999, p. 77) writes of 'a reality that is done and enacted rather than observed'. Mol writes of different performances of anaemia:

Fleshiness, opacity and weight are not attributes of a single object with an essence which hides. Nor is it the role of tools to lay them bare as if they were so many *aspects* of a single reality. Instead of attributes or aspects, they are different versions of the object, versions that the tools help to enact (Mol 1999, p, 77).

And Callon (1998a, p. 2) had begun his agenda-setting chapter by arguing that: 'economics, in the broad sense of the term, performs, shapes and formats the economy, rather than observing how it functions'. Helgesson and Kjellberg (2005) have translated Mol's argument into an explanation of the 'multiple versions of markets'. They identify markets with three categories of market practices, including representational practices, normative practices and exchange practices. The practices form actor networks and are connected by 'chains of translations' and economists theories are most clearly related to representational practices.

But which economics? If markets are to act, then they are implicated in commodification or commensurability, by which we mean arbitrage or making equivalent in value objects that by definition are not related in this way in other settings. Arbitrage is then an action of markets by which objects (such as products) are translated into goods and stabilized as goods relative to one another. Callon's (1998a,

pp. 19-23) first rehearsal of the arbitrage argument is in reviewing Garcia's (1986) explanation of the regional strawberry market. A civil servant redesigned and so invested in a market for the exchanges within an auction that mimicked textbook microeconomics. MacKenzie and Millo (2003) write in a comparable way of how the Chicago Board Options Exchange came to practice or perform the options pricing theory of Black, Merton and Scholes.

Our question draws upon the greater prominence of Chamberlin's (1933) theory of monopolistic competition in Callon et al. (2002) and Callon and Muniesa (2005). Callon shares with Loasby (1976 1999a 1999b) and White (2002) an interest in returning to and to some extent reviving Chamberlin's economics. Chamberlin (1933) performs markets in a radically different way to the neoclassical economists. For instance, he tries to explain how markets emerge from the different interests and powers of producers who seek economies of production at larger scale and consumers who are reluctant to trade off heterogeneous products at higher price for standardized products offered at lower price. Further, firms compete by identifying and varying the qualities of their offerings by proposing product differentiations (Callon et al. 2002). A consequence of Chamberlin's analysis is that there are gaps in economic space as a consequence of actors' performances and overlaps in performances in production, exchange and consumption/use (Potts 2000). In production, firms inevitably are different given their unique accumulations of situated experiences (Penrose 1959). And strategically, firms are different because they design their products in part to differ from those which they perceive to be rivals (White 2002). Consumers and product users similarly acquire experience in use, but for Chamberlin this spills over into buying behaviour specifically in markets. Chamberlin's broadly economic space is discontinuous because the chain of markets, one for each good, is produced through buyers taking into account a limited number of alternatives.

General equilibrium or systems theorists, such as Chamberlin's contemporary critic Triffin (1947), could not see why the economic space did not become much more densely and evenly connected despite firms engaging in competition by means of qualities. In essence competition displaces boundaries internal to broadly economic activities with a myriad of smooth exchanges stretching across long chains of connection involving arbitrage or more pertinently the mere threat of arbitrage. Conventionally the 'smoothing of Chamberlin's broadly economic space' has been represented as a question of production and of use, by product differentiation tending by means of price competition towards product homogeneity. By contrast, there is no reason why in principle smoothing cannot be established as an exchange solution, derived by buyers and sellers ordering the qualities of objects as goods against one another.

Callon et al. (2002) breathe life into a largely forgotten controversy in the history of economics, and their performative perspective has the potential to yield many insights into Chamberlin's analysis. But Chamberlin's theory is a ghost in the machine of economics and Callon et al. (2002) and Callon and Muniesa (2005) attempt a solution that is too neat, notwithstanding the consistent discussions of overflows that destabilize order (Callon 1998b). They want both local markets and so boundaries and discontinuities, together with smooth ordering within their markets: performing Chamberlinian competition between markets and overcoming Chamberlinian competition by arbitrage within markets.

Markets and heterogeneous goods

In Callon's (1998a) discussion of Garcia's (1986) study of the strawberry market, the market-maker invests means of grading that act as a boundary object to separate buyers from sellers. The means of grading qualifies strawberries into different qualities, such that a 'price gradient' comes to represent an order of qualities: 'it makes commensurable what was not so before' (Callon 1998a, p. 21). There may be unique uses for different qualities of strawberries. The market performances unify or relate heterogeneity across strawberries (Hetherington 1999). But there are further implications specifically in production and in use/consumption. Producers may invest in additional means of producing different and now stabilized qualities of strawberries with these different uses in mind. Producers could pass on their requests to suppliers of strawberry plants, who may develop specialist varieties. But in Callon et al. (2002) and Callon and Muniesa (2005), heterogeneity acquires a natural or given and also functional status and markets exist as spaces within which actors cope with difference by ordering it, up to a point. Markets are spaces in which products are transformed into goods: 'An economic good implies a degree of stabilization of the characteristics that are associated with it, which explain why it is in demand', whereas a product 'is an economic good from the point of view of its production, circulation and consumption' (Callon et al., 2002, p. 197).

Callon and Muniesa (2005) argue that markets are spaces in which actors stabilize heterogeneity in products by transforming these objects into goods by means of qualification and calculation. In other words, order or unity is co-produced as goods by buyers and sellers, who are the alter-egos in markets of producers and consumers/users. Qualification implies identifying some critically important characteristics or dimensions of a product and calculation implies ranking or ordering the heterogeneous

set of goods with respect to the characteristics or dimensions, which may also imply ranking the dimensions too. Cochoy (1998) merges these as the hybrid qualculation.

Qualculation is though a contested activity, even if we infer that its subsequent effect is that its actors co-produce an ordering or stabilizing and so co-produce heterogeneity. For instance, White (2002) develops a model in which producers differentiate their products as an activity in production but influenced by what they observe opaquely and interpret as one variant's success in achieving increased sales. But marketing management informs us that buyers perform the differentiation of goods by accepting or rejecting among producers' heterogeneous offerings (Ries and Trout 1986).

Qualification is then displaced by attachment and also detachment, which are strategies by which a seller (or perhaps buyer) invests in repeatable, durable and stable means of ordering among a variety of goods, such as in supermarket shelves. It is as if one party has to provide an ordering among varieties in order that one or more other parties can even act and so consummate the social space as a market, even if this often excludes or locks-out that other party (often a buyer) from significant qualculation. Cochoy (1998) and Callon and Muniesa (2005) draw attention to technologies and techniques of qualculation, which transform qualculation into un-qualculation and attachment. Loasby (1999a) draws on Marshall (1919) and Chamberlin (1933) in arguing that often firms have the incentive to be market makers: 'It is the trading partner who expects to engage in most transactions, and therefore is likely to gain the greatest individual benefit from being able to re-use the knowledge that is embedded in the market institutions, who normally has the greatest individual incentive to bear the capital cost of organising the market for those transactions' (Loasby, 1999a, pp. 199-120). What began in Callon's (1998a) argument as a co-production of a market by means of exchanges, tends in Callon and Muniesa (2005) towards sequential production of a market through attachment, qualculation and exchange, which adds up to a 'framing'.

Callon and Muniesa (2005) go further and argue that framings are means not only of stabilising the dimensions that matter, but are also means of calculation and attachment, such that buyers will repeat their purchases if they repeat the means of calculation. Sellers then have to destabilise the means of framing and calculation in order to detach buyers from established patterns of purchase and re-attach to other goods. This is another critical step in the entangling or actant argument of market making and market practices. When sellers are using their products as strategic (or rational and instrumental variables), the specific object of unsettling the established framings of other participants (especially buyers and other sellers) already within the general goods and market setting are characteristics that lead to (re-)attachment. Cochoy (1998) uses the example of a brand of orange juice, framed as being situated in a supermarket. To increase sales, the juice is produced differently to be slightly sweeter, but this is not primary as can only be experienced in a world of consumption (or production as consumption). Rather, the juice is re-attached by means of a free toy that has meaning to the cultural experiences of children, presumed to be accompanying parents in the supermarket. There is little by way of intrinsic or productionist connection between orange juice and a toy, compared with changing the sweetness of the juice itself, but sweetness is not effective as a characteristic that can be realised during an exchange.

Spillovers that identify boundaries between worlds of products and goods

Callon (1998b) and Callon et al. (2002) discuss the instability of framings within markets as actors rarely settle on comparable identifications of significant characteristics or dimensions in developing goods. The strategy of detaching and re-attaching further destabilizes the market setting. However, the spillovers spill-over beyond the market, considered as a social system with boundaries, to other settings, including production and use/consumption. Buyers and sellers, as the alter-egos of consumers/users and producers, may not calculate and choose very often. But buyers have their experiences of using/consuming, which are likely to be opaque to producers, and could even be opaque to themselves as the alter-egos of users/consumers.

Our argument is that the spillovers are not just in and around the emergence and selection of characteristics and dimensions as a good becomes stabilized and as references of strategies in changing the stabilized outcome in describing goods in market settings. Rather, the good in order to be so involves spillovers into the lifeworlds of its counterpart, the production settings of producing and consuming. Further, spillovers continually threaten to destabilize the momentary capture of products as goods, and of producers and consumers as buyers and sellers in market settings. All participants in a market, who are also parties to the framing, qualification and calculation of a good by means of a market, are also involved in the object's continuing career as a circulating product.

The product is a process that is punctuated or characterised by transitions within the product frame, as argued by Miller (2002) in his example of Sophie's car. The stabilizing of characteristics through rational and instrumental interactions among buyers and sellers, some of which can be considered as products themselves, such as with microstructures of exchange or goods tests and comparisons, spill over into products worlds. As Callon et al. (2002) argue goods have to be imagined before they are produced, in

which case the goods/products difference is not stable. In the example of Sophie's car, Miller commits a similarly unjustified framing in product worlds as Callon does in goods world. Sophie imagines the second hand car in her consumer world and makes sense of its being and using with reference to her values. Likewise the salesman, whose producer world is cast in less personal terms, undertakes selling activities in the context of personal and also corporate values.

As a simple example, newspapers in the UK have in last year begun including DVDs of movies as a free extra, especially at weekends, which in product terms transforms the newspaper into a newspaper DVD hybrid. Brook (2005) captures the producer perspective of this as promotional exercise, reporting that 'In the first week of October [2005], [UK] national newspapers gave away 10 million free discs, while on the high street, consumers bought just 3 million'. Brook peppers his analysis with 'frenzy' and 'give-away madness', voicing images of customers tearing away the DVD part of their newspaper-DVD hybrid and throwing the newspaper part away. Movies seem to be a far more effective way of emphasising editorial changes than previous promotional hybrids, such as travel offers and music compact disks. This may appear to be only in the goods framing as an attempt to attract new sales or at least protect established sales. It could briefly be an additional characteristic, but one that buyers could quickly become accustomed to. As a dimension, it is easily visible on newsagents' shelves, like Cochoy's (1998) free toy, which makes sense mainly within children's' cultural networks, with orange juice. In product terms, there would appear to be very little connection with producing a newspaper; movies as DVDs are simply acquired from another production process and added in. But the free DVD, or rather the weekend newspaper-DVD hybrid, has to be meaningful to its buyers as an object that can subsequently be consumed/used in order to be valued and to provide a reason for buying it. So the newspaper's producer seeks to provide an insight into its buyers' cultural worlds. And the marketing manager has to anticipate how the weekend newspaper-DVD hybrid is placed by consumers/users, hence the cyber conscience we will discuss in section four. It works on the level of constructing and reconstructing meaning, and only latterly in terms of calculation.

The entanglement and framing only works as a good if it works as a product. A free DVD with the Observer newspaper on the 9th April 2006 was 'Don't Look Now', initially released in 1973 and re-released in March 2001. The hybrid character of the product was deepened as the newspaper included a film review as if the film was being re-released in cinemas, and also by an article explaining the cultural significance of the film in part through interviewing the film's director (O'Hagan and French 2006). The free DVD had significant consequences for the production of the newspaper. It also anticipated its readers' uses and consuming of the weekend newspaper/DVD if anything deepening the established cultural entanglements and identifications rather than unsettling the other newspapers that constituted the market.

Much discussion in consumer research centres around McCracken's (1986) framework describing how meaning flows or is 'taken' from the culturally constituted world and 'loaded' into goods (in Callon's terms) and then re-created and thus instantly changed by consumers who then feed it back into the culturally constituted world. Our example spans the conventional distinctions of interactions in business-to-business and business-to-consumer settings. By following the spillovers beyond the market setting, we can draw attention to the dimensions that Callon neglects, such as semiotic interpretation, construction, meaning and understanding. In contrast, Miller (2002) develops an interpretive framing of Sophie's car, but gives little attention to the moment or moments of market.

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In summary, we recognise Callon's distinction between framings of goods and products, but dispute the quality of this distinction in lifting objects out of a production framing through developing in markets an entanglement as a good. Rather, goods and products continue in different lifeworlds, side-by-side. Slater (2002 p. 248) refers to marketing as a meta-technology that can easily resolve incommensurability through calculation and qualification in moving between different lifeworlds. We would like to draw attention to the significant interpretive rather than calculative activities required in inhabiting the lifeworlds of product and good.

The limits to calculation

Since the middle of the 20th century, the marketing discipline, at least in its more scientific guises, has firmly subscribed to what Theodore Porter (1986, 1992) calls the 'rise of statistical thinking'. An armoury of computational tools has been developed to aid marketing managers' decision making. Further, the use of computational tools justifies the actions of marketing managers, for which they are held to be accountable. On these bases, marketing management can be said to be exemplary of Callon's notion of calculation. In the following we draw on the expositions of calculation in Callon and Muniesa's (2005) and Callon and Law's (2004), examining both strengths and weaknesses of this concept. Our argument in this section is that contrary to expectations, the existence of a marketing manager is not only defined by calculation (and non-calculation) in a market setting, but also with attempts to interpret the lifeworlds of production and consumption that often surround markets.

In developing their notion of calculation, Callon and colleagues warn against the dangers of explaining market activities by resorting to impersonal laws, the preferences and competencies of disembodied economic agents, or explaining away the existence of calculation through a micro-analysis of actors' practices in real settings. Instead, they propose calculation as inhabiting a middle ground where real practices are explained by examining the underlying principles of manipulating the entities to be calculated and the way decisions or judgements are made as a result. Following Callon and Law (2004), the difference between calculation and judgement, as established in social science discourse, is unhelpful and implies misleading boundaries because both are instances of broad calculation. Of greater interest is the more contentious difference between calculation and un-calculation, in which otherwise calculating actors are unable or choose not to calculate.

Calculation, following Callon and Muniesa's (2005) account, consists of three steps. The first step is the detachment – or disentanglement, in Callon's parlance – of the entities to be taken into account (for example, goods traded on the markets) and their arrangement in a calculative space, such as a supermarket shelf or a product category. This first step is closely related to Callon's concept of framing. Actors decide on what to take into account and what, quite literally, to leave 'out of the equation', as a residual and hence as an instance of spilling over. Note that this is an instance of including judgement within calculation, as framing occurs initially. The second step consists of the association and manipulation of the entities to be taken into account. For example the comparison across dimensions between two or more goods deemed to be similar and so in a category or market segment or supermarket shelf for purposes of differentiation, or how A is not like B. The third step in calculation is the extraction of a (manipulated) result, linking the entities ordered in the calculative space and the manipulation carried out, such as a ranking, a decision or a sum.

In essence, calculation, or rather 'qualculation' (Cochoy 1998), is analogous to a narrative where actors deliberately included or excluded elements, put these in (spatiotemporal) relation to each other and then manipulated them in order to extract a conclusion. Callon and Law (2004) elaborate on the conditions in which such qualculation is made possible and impossible. They recount the story of the Cullen Inquiry into the Ladbroke Grove rail crash in West London in 1999. It is important to note that the inquiry occurred within a setting, a legal process, in which a reasoned conclusion was expected by all participants. During the course of this inquiry, numerous stakeholders created narratives and accountabilities that defused responsibility from their part. However, rather than assisting the presiding judge Lord Cullen in his calculations and final judgement, the disparate accounts and the framings of each contributed to what Callon and Law call 'proliferation', which is one of two conditions (the other is rarefication) where qualculation is made impossible. The end result of the inquiry, which provided a spatiotemporal framing for the various qualculations made, is yet another framing of the material and elements available. Thus, rather than lending closure to the manipulations carried out, the result of the manipulations add to the proliferation of incommensurate narratives.

We argue that this state of 'proliferation' is often reached, indeed perpetuated, in marketing management. It is more than simple information overflow, which could be dealt with through ever-increasingly intricate algorithmic tools. Rather, and according to Callon and Law (2004, p. 729), it is a state where "everything is connected – and made dependent on – everything else", as with a fully connected network structure. Despite its menagerie of research tools, market insight instruments and future projections – centres of calculation, in Callon and Muniesa's (2005) words – marketing management is prone to this 'problem of difference' (Mol 2002) in that the marketing manager has to live and deal with multiple and often conflicting realities. By the very actions she takes and calculations attempted, she also immediately influences the entities to be captured in the first place. To quote Callon and Law (2004, p. 730) again:

This is because the numbers are constantly changing. [...] They are never fixed. They never come to an end. The list is never closed. Instead, they are always out of date. They reflect a set of overflowing processes.

Further, the overflowing in some circumstances encourages yet more qualculation rather than resignation. We believe that this state of proliferation – and thus non-qualculation – is reached because

the marketing manager by necessity resides in three different worlds, in the goods world and in the products world, which itself covers worlds of production and consumption. We showed in the previous section that the goods world may be a world where disentanglement is possible and overflowing can be acknowledged yet temporarily disregarded because market frames are by definition implicated in the momentary acts of buying and selling. The goods world comes into being where material and human actors together in a spatiotemporal frame or organised social space called 'the market' act to calculate the goods chosen to be contained by it.

Non-qualculation can be developed further. In the world of the market and goods, creating the conditions of non-qualculation is a normal activity. The elaborate means of computation can quite easily be directed strategically to this purpose and of course other participants are also presenting elaborations of their goods, encouraging further attempts at qualculation in order to make others' attempts at qualculation that much more difficult and requiring further computational resources and capability. So the network of events that starts with attempts at qualculating, be it among buyers or sellers, or their agents, spills over not just into further qualculations but into more durable and so productive lifeworlds.

The product world is also a world full of entanglements. Indeed, the goods world is disentangled from the product world in order that qualculations implicated in buying and selling can occur. Following strict economic logic, buyers and sellers should be content with a high degree of ignorance about how goods are translated from the world of production and how goods are subsequently translated into a world of consumption, which is also generally productive. While Callon et al. (2002) envisage a career for objects, including transitions from objects of production to objects of buying and selling to objects of consumption, there is very little discussion of these translations (unlike in consumer behaviour research, and for that matter organisational behaviour and some brave bits of evolutionary economics). There seems little a priori reason to make the market and so the goods world central to our explanation. If we do, the activities and worlds of production and consumption feature as residuals or spillovers, or even systemically as environments. Of particular interest is the role of the marketing manager, whose role it is we suggest to inhabit worlds of production, buying and selling and also consumption.

Despite the economics idea of the market as an insulating device, give or take the unaccounted for spillovers, marketing managers and consumers do like to experience something of their counterpart's lifeworlds. Consumption consummates a world of production, with ethical implications. These are not only spillovers such as pollution, but also conditions of employment and the broader circumstances of production. Producers not only seek to attach products (perhaps as goods) to consumers' lifeworlds, but seek to learn something of these lifeworlds, extending to shaping these lifeworlds. It is unclear whether we should locate any attempts by producers to alter their products as goods relative to perceived rival offerings and perceived consumer worlds as actions in the production world or in the goods world. In either instance, the manipulation is an instance of qualculation.

Contrary to Callon (1998a) we maintain that these two worlds cannot be neatly separated. While the goods world is about closing off the narratives, we see the marketing manager's job in the product world as being essentially "about keeping things open" (Callon and Law 2004, p. 730). The product has to be imagined by both producers and consumers (as producers) thus contain enough "functional blankness" (Brown and Middleton 2005 p. 705) to be the ultimate malleable object – objectified but also attached, which is how Miller (2002) describes Sophie's car, calling "into question the forms of ordering into which it is subsumed and allows them to be reformulated. ...It is an element which potentially fits anywhere" (Brown and Middleton 2005 p. 705).

Thus, the marketing object – a phrase that we adopt in preference to good or product – is at once overdetermined (in the goods world by being differentiated from competitors' goods and thus clearly demarcated) and underdetermined (in the product world by being a 'virtual' object upon which consumers (and also other producers) can create their own connections). It is thus a boundary object because different interpretations, shapings and uses can be supported by it while allowing different actors opaque views or glimpses of another actor, perhaps extending to another lifeworld. In his 'Theory of Shopping' Daniel Miller (1998) for instance shows how ordinary supermarket goods become a canvas on which social relationships are formulated and made stable. These attachments can be used by the marketing manager in our cyborg guise, which we will discuss below, to at once differentiate her product from others and to provide a virtual object for the consumers to build their lifeworlds upon.

To return to our example of the free DVD included in UK Saturday and Sunday newspapers, the paper-cum-DVD is a marketing object with boundary status. It is overdetermined because it is loaded with significance and difference – 'this is how we are *not* like other newspapers, we are classy and cultured because ours is an Arthouse movie'. It also draws the consumer into its production world and allowing them a glance at self-reflexivity by cutting across media to the film review section of the newspaper. It invites consumers to differentiate, distinguish and qualify themselves along the same lines as the paper differentiates itself in the goods world: 'if you buy this paper you are classy and cultured, not like those *other* people who buy other newspapers with chick flick DVDs'. Yet, it is also underdetermined because

the consumer does not have to accept the invitation. She can ignore or indeed subvert the difference that is inbuilt in the goods world; she can overlook or ridicule the self-reflexivity of the production world, and she can attach the good-now-turned product to her own relationships and entanglements; watching it on a quiet Sunday afternoon, imagining conversations with friends or colleagues about the movie in question, leaving it in prominent view of visitors or indeed hiding it because of its (lack of) production value, discarding it together with the paper wrapping and concluding that this wastage shows a lack of concern for the environment by the publishing house – hence casting a glimpse into and commenting on the production world – and so on.

In this example, the marketing manager becomes a veritable boundary manager who has to negotiate both goods and products worlds as well as the overlaps between these two lifeworlds. So, more than just negotiating 'distributed' calculations as described in Callon and Muniesa (2005), the marketing manager actually negotiates at once calculation and non-calculation (in the form of proliferation) at the boundary between different networks and sets of attachments. Surprisingly, this negotiating of the incommensurate does not lead to paralysis but to action and market exchanges. Thus, in answering Callon and Muniesa's (2005) concluding question we would argue that calculation along with non-calculation, cast as its other, is not the only possibility for action. Rather, non-calculation and calculation generate different types of action, as visible in the lifeworlds of the marketing manager. We will now proceed to investigate the kinds of action the manager engages in through his boundary existence(s) more closely.

Boundary objects and the marketing manager's cyborg consciousness

The preceding two sections have presented and critiqued Michel Callon's ideas of calculation, his goods/products distinction and the implications this has for boundaries between the lifeworlds of production, markets and consumption. We have argued that rather than being at some stage disentangled as a good and thus closed off, the career of a product by necessity entails being opened up and so becoming a virtual or boundary object (Star 1992) that brings a temporary halt to the potentially boundless expansion of the network. This section will now examine the implications this boundary existence has on the manager managing the marketing object.

Especially in his early work, Callon (1980, 1986) has repeatedly drawn on the work of Michel Serres who developed the notion of 'blank dominos' or objects that allow nets of actions to be halted or transformed (Brown and Middleton 2005). Brown (2002) evokes the image of a rugby ball to explain this notion of 'blank domino' or 'quasi object': on its own the ball is nothing, it is under or even undetermined. Yet, it manages to orient players around itself and virtually transforms them into its own extensions. Interestingly, as Brown points out, Serres also claims that the one left holding the ball is 'it', at once the privileged and the excluded player. In analysing the role of quasi-objects in social practices, Serres' work invokes the figure of the messenger, most prominently in the guise of Hermes or an Angel, who has the dual task of boundary spanning and translating (Brown 2002).

We argue that the messenger figure in Serres' work is fundamental to an understanding of the marketing manager's existence. Rather than utilising the deeply mythical metaphors Serres employs, we propose the more contemporary metaphor of the cyborg manager for understanding the marketing manager's task of translation. The cyborg, as described in the analyses of Wood (1998a and b) and Haraway (1991) is the ultimate boundary spanning actor. The cyborg is by definition transpersonal, a hybrid, most often of human-machine characteristics, at once internal and external, straddling boundaries and by its very nature embracing multivocality and multiplicity (Wood 1998a). Cyborgs live in two (or more) worlds and embody both (or all) of these worlds; they are 'me' and 'not me' at the same time. Boundaries that seem fixed and secure fold in the cyborg identity of including the other (Mol and Law 2005). In addition, the cyborg is the ultimate embodiment of an extended mind (Clark and Chalmers 1998).

Much of the cyborg's cognitive resources are in fact external and hybrid; a mixture of ultimate rationality and ultimate ignorance. Through this, the cyborg him/herself is never finite but is "a set of partial connections, between what is real and what might perhaps be performed into being" (Law 2000 p. 7). In this sense, the cyborg existence – and with it cyborg sciences such as management – is, according to Carney and Williams (1997, p. 783) also always emerging: "The future is yet to be created ('enhanced'), it appears open-ended". This creative, emergent aspect of the cyborg existence, so easily compared to that of a manager, is nicely illustrated by John Law's description of 'Andrew', a hypothetical manager in a science environment, and his attempts at 'qualculating' in the face of various overlapping lifeworlds and his own partial identities (Law 1997). The cyborg, in this sense, has the privilege (and burden) of partial or 'split vision' embracing an awareness

that is sensitive ... to the creative possibilities of a world in which what we used to think of as 'systems', or 'networks', or 'projects', or 'people', or 'rules' are not necessarily rigidly consistent, centred, and monovocal, but rather perform, reflect, and enable fractional and shifting coherences (Law 2000 p. 8)

With this, the cyborg is the opposite of the bounded perspective of the Cartesian individual (Wood 1998b). Unlike the 'heroic' (and calculating) manager who perceives themselves as separate from those who for example develop, deliver or consume products, the cyborg manager is 'worldly' in the best sense of the word – she manages 'on the edges' (Gosling and Mintzberg 2003). Like the marketing object, the marketing manager resides in many different lifeworlds; the various interlaced ones of production, its neighbouring worlds of supply chains and corporate partners, and those myriad different ones of "particular people in particular places buying and using products in their own particular ways" (ibid., p. 60).

Much of the marketer's cognition is external and distributed, materialised in industry reports, market projections and consumer feedback which are amenable to calculation, but also embracing hunches, intuition and a 'feel for the market', which may lead to un-calculation. Like the cyborg existence, the role of the marketing manager involves a continuous becoming – in the form of a product that is performed into being by a multitude of actors such as R&D, market research, finance, production, supply chains, distribution, advertising and of course the user, whose worlds need to be translated or fused into the marketing object. The cyborg manager is not so much an all-powerful agent who controls these diffuse and often fleeting networks, as the locale where lifeworlds meet and interact and so has a boundary existence herself. Marketing represents the intersection where fractional realities are ordered and reflected. Unlike Callon's (1986) spokesman who channels voices so that they will be heard in unison, the cyborg manager lives with multivocality.

A marketing manager's existence, in this sense, is a "high tension zone" (Star 1991, p. 45). It is about accepting multiple identities, allowing for multiple modes of ordering, calculating and un-calculation and only thus being able to imagine and perform an object that combines, translates and projects different lifeworlds. It is less about bringing multiple identities 'in line' or enrolling them than about keeping things open. The cyborg existence is thus an existence that can be seen as "produced in the shifts and displacements of relations" (Law 2000, p. 9) and that itself produces the marketing object as the ultimate expression of relationality on the boundaries of overlapping production/market/use lifeworlds.

Discussion and conclusions

For Callon, qualculation makes markets and markets make qualculation. We do not dispute that markets are organised social spaces where agents bring with them different experiences and perceptions and undertake different calculating activities in making sense of the array of opportunities of valuing, buying and selling. While calculation disentangles objects from production and consumption briefly, we are less convinced that the continuous spillovers that result from the market's disentangling and from actors' framings can remain within the market as a continuing process of re-qualculation. In neoclassical economics, *homo economicus* can exchange property rights over some object – a good – and it is a clean break. Buyers already know their worlds of consumption and this is not unsettled by the good-object. Neither are they unsettled by the conditions in which the good-object was produced. Producers already know what they are capable of, and this is not unsettled by what they produce or by perceptions of how their product is used. Rather, actors are unsettled by changes in prices.

For Callon, the market as an organised social space, rather than the exchange of property rights as a contractual moment, performs the clean break in between production and consumption. But Callon makes problematic actors' interpretations of offerings as goods that circulate in the organised social market space. Goods are different for buyers and sellers because they are produced and consumed through different historical processes by actors with different experiences in production and consumption. Aggregates such as price are not particularly helpful for actors in markets in making sense of the array of offerings. Rather than indicating value, they may be drawn upon as a quality, or an indication of a property. Even worse, actors bring with them and develop in situ strategic interests in interpreting goods as strategic variables. Sellers seem to enjoy an advantage over buyers in this respect in confusing buyers through multiplying the dimensions and opening these up to multiple plausible interpretations.

We can expect un-qualculation as much as qualculation, with the conditions for un-qualculation perhaps representing some agents' (strategic) qualculation at one step removed. These sense-making activities, these re-qualculations and spillovers, cannot be contained within the world of the market and the good. The world of the good is one of continual comparison with other goods, but their unsettling, un-attaching, un-framing, un-entangling and un-qualculation is a matter of production and consumption. Qualculation happens in production and consumption too, but it is of a different character. In contradiction too of Slater (2002), there is no emergent meta-calculation across these different worlds. Rather, the question is of how they can co-exist.

Our attention is drawn to boundaries and fittingly these too have human and non-human dimensions. For the neoclassical economist, the market, or rather the acts of exchange or buying and selling, is itself a boundary. But economic sociologists, including Callon, have developed the market into an organised

social space, inhabited by actors and circulating goods. Objects become goods and along with actors move into and out of the organised social space of the market. This conceptual way of framing the market implies that the boundaries are with lifeworlds of production and consumption (and others). We contend that this added complexity both creates schematically and helps resolve practically the question of over and under-determination. As argued above, objects as goods can be over and under-determined because market actors have great difficulty in stabilising goods through establishing a consensus as to the dimensions that matter. If the question is continued only within the market space, the processes of re-qualification, re-framing, re-entangling and re-attaching can continue well beyond the fleeting image of the market itself, as transition phase in the career of an object. Production and use can though place some bounds on these questions, or at least transfer the questions into different lifeworlds. The blank domino supports different uses, but this flexibility in itself can be understood by consumers.

The strength of the boundary object is that it can both defy consensual definition among actors, such as over the good's dimensions which really matter, and yet allow different actors to retain their understandings of the object. It is through the good as the boundary object that one can gain insights of the other. In some respects, our focus on the boundary takes us a few steps back in the direction of neoclassical economics. For many actors, the boundary object allows them to get by with an opaque understanding of their counterpart. This is not quite the clean break where goods are represented by property rights which are alienable, but recognition that the spillovers spillover to somewhere and that this is potentially helpful in preventing a rapid infinite regress in the market space

So much for the object that marks the boundary between the organised or organising social spaces; what of the cyborg marketing manager? The cyborg marketing manager is able to understand, communicate and act in different social settings and thus manage the good as boundary object. The cyborg manager has a distinctly extended mind. There are no decentred, codified or computational algorithms that can combine and so ameliorate different social settings, such as market, production and consumption, and so no meta-method. Rather, boundaries are also populated by cyborg actors alongside boundary objects. Their strength is not so much calculation or other articulable means of collation or aggregation, but of developing personal means of blending into different lifeworlds. Rather than leaving work as an employee and popping into the supermarket as a buyer and then returning home as the consumer or end user and constructor/interpreter of a lifeworld, the cyborg marketing manager has the ability to always combine these and other identities. And as in the Terminator movies, themselves both over- and underdetermined marketing objects, only occasionally do cyborg managers get found out as interlopers rather than authentic inhabitants.

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