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Experiments in co-modification: a relational take on the becoming of commodities and the making of market value

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ABSTRACT

Social studies of science have for many years analyzed and demonstrated the key role of experiments to science and the making of facts. But what is the role of experiments in market work? And what, if anything, can we learn from them about markets and commodities? It is perhaps tempting to say that we can learn very little. This paper investigates a series of market research experiments investigating consumers' valuations of farmed fish, and these are almost comical in their painstaking attention to mundane details. However, when looked into closely, they provide key insights into commodification processes and the scholarly literature to understand them. Most importantly, their analysis allows us to grasp how commodities do not simply emerge as the outcome of a one way process directed towards the market, but through a relational process that jointly works with and acts upon things and people, markets and production. The paper works with the notion of co-modification to trace and stay close to these relational processes. In doing this the paper simultaneously strives for an approach that is not framed by the dominant conceptual distinction between production and market, but instead directed towards the materiality and activeness of the things exchanged. The notion of co-modification emphasises that there is more to market than the human hand. The paper shows that it can also be used in a stronger sense to suggest that commodification is a process where things, people, production methods and markets are actively modifying one another.

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Introduction

How and where do things become commodities? The question has occupied socio-economic enquiry since at least Marx. Endeavours to answer this question sometimes take us to unexpected places. And the other way around: unexpected places can come to our rescue in trying to enhance our understanding of commodification, of what it entails and where it happens. As part of a broader inquiry into the economic life of codfish – perhaps the quintessential Norwegian commodity – we found ourselves visiting peculiar laboratory settings, sites where researchers recruited volunteer participants, designed auctions, prepared and sometimes cooked fish, wrote surveys, processed data, all in order to study what they call ‘consumer preferences.’ These experiments appear relatively simple, even quite banal and almost comical: they consist of having people try different

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fish samples, either at home or in a lab, and rating these samples in qualitative and quantitative – that is to say, economic and monetary – terms. However, they require careful preparation and a minute attention to detail. This includes attention to: the freshness of the fish; the storage, packaging and sometimes shipping of the fish; the time of day and its suitability for a fish meal; the optimal cooking method and seasoning; or the fish-eating habits of participants.

Despite their apparent dullness, or perhaps precisely *because of* this minute attention to detail, these experimental sites teach us something quite important about processes of commodification: they expand our understanding of *where* commodification happens and provide careful and vital insight into *how* it happens. First, these experimental sites draw the market site and the production site together and are in themselves sites of commodification. Second, they open up how the enactment of commodities is a profoundly *relational* endeavour. In alerting us to this, they help us develop our understanding of commodification, not only empirically, but also analytically: commodification, we suggest, can be grasped analytically as processes of *co-modification* (Asdal 2015).

From commodification to co-modification

Those familiar with studies of markets and STS know that it is not that unusual to start from detailed analyses of seemingly small, mundane objects in order to tease out the functioning of markets and economies. The emphasis on ‘market devices’ (Callon et al. 2007) has transformed the way we understand the making and re-making of markets and commodities, by bringing objects, techniques and practices to the fore. A recent collection of works directly addresses ‘mundane market matters’ as being ‘both ordinary and profound’ (Neyland et al. 2018), extending STS’s investigations into the role of ordinary things like shopping carts or supermarket displays (Cochoy and Grandclément-Chaffy 2005, Cochoy 2007). The same attention to the nitty-gritty of devices and practices has informed STS inquiries into the laboratories of economics and marketing, such as focus groups (Lezaun 2007, Grandclément and Gaglio 2011), economic experiments (Teil and Muniesa 2006, Guala 2007, Muniesa 2014), and tasting and smelling trials (Teil 1993, 1998, Muniesa and Trébuchet-Breitwiller 2010, Muniesa 2014). By showing how humans in specific settings become ‘economic’ agents with tastes, opinions, preferences and a capacity to articulate and calculate them, these analyses shed light on the performance of economic agency.

In this turn to markets, the attention to materiality has been primarily directed towards the devices and infrastructures that equip economic agencies, market settings and commodification. Surprisingly given the interest of STS in more-than-human capabilities, fewer analyses so far have put the very things being exchanged front and centre. However, if we are to provide a substantially better understanding of commodification processes, we need to extend the description to the very things being exchanged, considering how they actively play out in commodification processes – or, as Slater (2002, p. 96) puts it, seeking to ‘understand the changing materialisation of transactable objects’ and their ‘commercial ontology.’ In doing this, we take our cue from earlier work in valuation studies that has already started investigations in this direction, taking things seriously in valuation processes (Slater 2002, 2014, Çalışkan 2010, Escala 2013, Leymonerie 2013, Vatin 2013b, Asdal 2015).

Our ambition is to work empirically and analytically to account for the materiality and possible ‘agentiality’ of commodities in commodification and valuation processes, taking the experiments on codfish as our site.

In doing this, we aim to show how a close description of the nitty-gritty work involved in market experiments can lead to an understanding of commodities as things that emerge, not as the outcome of a one-way process directed towards the market, but rather as the result of *co-modifications* – that is to say, as a relational process that jointly *works with* and *acts upon* things and people, markets and production.

In pursuing this co-modification approach we also lean on Vatin (2013a, 2013b) and his way of engaging with the distinction between ‘evaluating and valorising.’ Drawing on a collection of

empirical studies that seek to open up ‘the “black box” of value creation’ (Vatin 2013a, p. 47, 2013b), Vatin argues that the notion of valuation encompasses two processes: the *assessment* of value – evaluation – and the *creation* of value – valorisation. This allows for analyses that ‘grasp the process of value creation, both on the market and upstream from it, via the practical operations by which goods and services are measured, valued, and technically and economically elaborated’ (Vatin 2013a, p. 43).

In this way, Vatin mainly aims to expand the focus of economic sociology to include labour, organisation, management and production processes in analyses of valuation. However, his attention towards the dual processes of evaluation and valorisation also brings the materiality of commodities to the fore (Escala 2013, Leymonerie 2013). Our paper aims to contribute to this endeavour. This does not mean disregarding consumers: as the above-mentioned studies of economic experiments show, consumers too are measured and transformed during experiments. In fact, our concept of ‘co-modification’ urges us to pursue a relational approach to commodification and valuation.

Market experiments: acting with things

Being concerned with ‘things’ is nothing new in itself – not in STS, nor in economic sociology and economic anthropology. Research influenced by scholars such as Appadurai and Callon seeks to understand how things are made exchangeable. Appadurai (1986, p. 13) defines the ‘commodity’ status not as a feature of things in themselves, but as the situation in which their exchangeability is their socially relevant feature. The focus, then, shifts from commodities to ‘commoditisation,’ that is, to the operations, practices and settings through which things are made fit for exchange.

STS scholars exploring the practices and devices that frame markets have similarly conceptualised the circulation of things as a process of continuous requalification and valuation (Callon 2005, Callon et al. 2007, Çalışkan and Callon 2009, 2010). Relying on concepts such as ‘qualification,’ ‘passivation’ and ‘disentanglement’ of goods, Çalışkan and Callon (2010) have analysed the devices and ‘framings’ that are deemed necessary to make goods passive, stable and disentangled from their contexts so that they can change hands.

Our approach, however, also relates to recent attempts to rethink the relationship between products and consumers, and the very conception of production, in philosophy (Charbonnier 2020, p. 373) and in the social sciences (Slater 2002, 2014, Slater and Tonkiss 2013). Slater’s argument is ontological, as the notion of ‘social ontology’ indicates. It is motivated by a search for ways to account for ‘the social processes by which things come to be treated as things in the social world’ (Slater 2002, p. 96), leading to interrogations on what it means to be a ‘subject’ or an ‘object.’

In contrast, the notion of co-modification is not so much ontologically as empirically and methodologically driven. It is suggested as a way to equip us with the capacity to explore how commodified things take part in commodification processes, not necessarily in the sense that they are active players, but rather in the semiotic sense that they make things happen or allow for things to happen (Greimas and Courtès 1979). We suggest this as a move towards the ability to account for how commodification is not necessarily a one-way process where things are transformed to become commodities (from things to commodities, from production to market). This move enables us to investigate how things, people and markets are modified *together* as part of commodification and valuation processes.

In her 2015 study, Asdal analyses co-modification linked to innovation strategy documents and their efforts to develop the Atlantic cod into a farmed commodity. She shows how such innovation strategy documents work to enable and value farmed cod as a commodity by co-modifying the cod ‘biology’ and the market. The analysis shows how market research and experiments were made integral to the innovation strategies. We extend this analysis of co-modifications to the experiments themselves.

Table 1. Main characteristics of the three studies considered.

	Setting	Fish	Consumers	Methods used
Study A	Lab	Wild cod, farmed cod, salmon, pangasius, monkfish	French consumers	Sensory trial Experimental auctions Surveys
Study B	Field	Wild and farmed cod	Dutch consumers	Quality Index Method (QIM) Sensory trial Surveys
Study C	Field	Wild and farmed cod	Restaurant chefs in three countries	QIM Sensory trial Survey Interviews

The experiments we analyse stage and document encounters between cod and consumers that are set up as ‘life-like’ as possible. This is to test different versions of the codfish and consumers and ultimately to suggest ways to improve the commodity.

Acting with codfish: three experimental market studies on farmed Atlantic cod

The empirical analysis that follows is based upon three experimental studies carried out in the early 2000s. The studies were funded by either the Research Council of Norway or the Norwegian Seafood Council as part of their interest in developing markets for farmed cod. They all resulted in academic publications, and in one case in a report, which informed ensuing innovation strategy reports. We analysed how these publications gave accounts of the experimental work. Additionally, we interviewed nine of the scientists involved and visited two of the laboratories where the experiments took place. We also interviewed researchers who had not participated in these experiments, but use similar methods. In total, we conducted 13 interviews about the practicalities of market experiments. We rely on the published papers and on the interviewees’ accounts of experimental work to retrace the experiments, from their setting up to the presentation of their results in scientific papers.

We refer to the three studies as A, B and C (Table 1). Study A was a laboratory study led by economists in close collaboration with sensory scientists, with a partner from the cod farming industry. It took place in a sensory laboratory: a room divided into isolated cubicles all connected to a kitchen. It combined two kinds of method. First, it drew on food and sensory science, which studies how people react to food when tasting it: as part of the concrete experiment participants tasted fish and were asked to assess it as food. Next, the experiment included an experimental economic part, using economic incentives to elicit participants’ ‘willingness to pay.’

Studies B and C were field experiments carried out by marketing researchers and food and sensory scientists. They began with a sensory appraisal of the fish by experts, after which the fish was shipped to participants who tasted it at home and filled in surveys about their valuation of the fish. The main difference between studies B and C is the group of consumers considered. Study B investigated the preferences of Dutch consumers cooking and tasting the fish at home. In study C, chefs in up-market restaurants from three different European countries cooked and tried the fish in their own restaurants.

The three studies all compared farmed cod and wild cod. The number of participants ranged from 90 to around 1,000. The participants were recruited using research centre databases or contacts, consumer panels, or, for the chefs, in collaboration with the Norwegian Seafood Export Council.

Becoming a commodity: five experimental steps

We distinguish between five steps in which both the product (codfish) and the consumers (experimental subjects) are acted with. We further categorise them into what we call ‘pre-modifying’ and

‘modifying’ operations. The pre-modifying operations include, first, the preparation and staging of the experiments, and, second, the pre-valuations of the fish and people separately. The three modifying operations include the encounter of fish and people, the characterisation of the commodity in the experiments, and, last, its generalisation into a discussion of the commodity outside the lab. At every step, concerns about the quality of the commodity are intertwined with concerns about the quality of the experiment.

Pre-modifications: staging the experiment

The experiments bring together a product and consumers. A great deal of care goes into preparing this, as both have to be modified before the experiment takes place.

Pre-modifying the codfish

The fish is prepared to be sold and eaten, with the added requirement of measurability and reproducibility. The care in this preparation is brought into the resulting papers that minutely retrace the journey of the cod. For instance, in study B:

The cod was caught in Finnmark and had an average weight of 2.5 kg after catch. Then it was farmed raised from July 2001 for a period of 8–9 months and fed manually. The feed consisted for (sic) 80–90% of capelin. Starvation period before slaughtering was four weeks. On Tuesday 2nd of April 2002 the first batch of cod was slaughtered. [...] The cod with head on [...] was stored on ice before and during transport by plane to the Netherlands. [...] stored at chilling facilities at Amsterdam Schiphol Airport. [...] April Seafood partners in IJmuiden processed the wild and farmed cod respectively (filleting and packaging in modified atmosphere (MAP)) under supervision of RIVO. Each package contained a cod fillet portion of approximately 150 grams. (Luten et al. 2002, p. 45)

This care is about controlling the experimental situation as much as it is about ensuring that the cod is at its best. In this way the materiality and the biology of the fish come into play in very concrete ways.

The three studies compare wild and farmed cod. Studies A and B both explicitly take into account the seasonal variations of wild cod. A challenge is that wild cod gives lower quality fillet during the spawning season. Hence, in study B, the experimenters decide to use Icelandic instead of Norwegian cod because in the colder waters of Iceland, the spawning season does not coincide with the time planned for the experiments. Study A uses a different strategy, including seasonal variations in the set-up by organising experiments in the winter and spring.

When shipping, preparing and packaging the fish, the experimenters work with a perishable product. They try to bring it in ‘in good shape, at the right time, in sufficient quantities’ (Interview 4, lab study). Because of the experimental, controlled setting, they also take care to ensure stable quality and freshness throughout. In field experiment C, where consumers taste the fish at home, experimenters synchronise the shipping so that it takes the same time for all the fish to get to their destination (Bjørklund et al. 2007, p. 56). To keep the fish in good shape until it is eaten, they are careful not to break the cold chain and to ensure that consumers have time to use the fish before it turns bad. In the lab experiments, the experimenters ‘supplied cool bags and ice packs’ (Interview 12) so that participants can safely bring the fish they purchase back home. In field study B,

for each household a polystyrene box was prepared containing a freezer pack, one package of cod per person, an instruction form, one set of questionnaires per person and envelopes. The boxes were labelled with the name of the household and transported Tuesday afternoons to six distribution points from where each household could collect the box the same day. (Kole et al. 2003)

The packaging is crucial both for the commodification of the fish and for the experiments themselves. The package needs to conform to regulations – for instance, displaying a use-by date. But it is also part of the experimental design, especially because it determines what information

participants get about the fish. Controlling this information enables experimenters to test how it influences consumers' perception and appreciation – for instance, using different labels for different groups of consumers. As one experimenter from study A explains:

We received the product labelled in a certain way, but we did not want consumers to have this information, we had an idea of the information we wanted to give them [...] we had recreated a label [...]. Concretely, it means, well, preparing these labels, removing the commercial labels to replace them with these labels. (Interview 12)

The last step in the pre-modification of the fish for the experiment is its cooking. Experimenters calibrate the cooking procedures and make sure they are reproducible. There are differences between the lab and the field experiments, as it is easier to control cooking in the lab. In lab study A, everything is tried and calibrated ahead of the experiment 'to really have the taste of the fish' (Interview 12), from cooking times to saltiness: the cooking method should be the same across the experiments, and it should give a palatable result without altering the fish too much. The researchers hire a cook, and the fish 'was steamed, without sauce, without spices, except salt, it was just slightly salted. (...) we did trials, to find a level of saltiness that was (...) relatively neutral' (Interview 12). In the field experiments where participants cook the fish themselves, written instructions explain how to prepare the cod. For instance, in study B, 'the participants were asked to fry the cod and not to use sauces with strong taste. It was allowed to use mild spices like salt and pepper' (Luten et al. 2002, p. 46).

The preparation of the fish for the experiments illustrates at least two ways in which the flesh of the fish is acted with and allows for things to happen. First, the seasonality and perishability of the fish call for strategies that imply modifying the fish itself (for example, freezing it) and the market (for example, time of fishing, organisation of distribution and storage, packaging and use-by dates). Second, bringing out the taste of the fish requires work on cooking techniques and seasoning that let the fish express itself, so to speak, but also on instructions for consumers, so that they stick to the best way of relating to the fish.

Pre-modifying the consumers

The experimenters similarly select and prepare the people who participate in the study. There are different strategies to recruit participants: some research groups have built databases of registered volunteer-tasters, others rely on contacts in associations, schools or church groups who can relay the call, and others use established consumer panels. The three studies focus on how different types of consumers perceive farmed cod, so the participants are selected according to this interest. In studies A and B, the participants are 'naïve' tasters, expected to provide a candid assessment representative of standard consumers. In both experiments, they are selected from consumer panels or databases and screened to be representative of fish buyers. For instance, the paper resulting from study A explains that 'all the participants said they were part of the food decisions in their household, eat fish at least once a month and purchase fish at least every second month' (Rickertsen et al. 2016, pp. 3–4). Study C considers a specific set of consumers: restaurant chefs. The experimenters consider them to be experts in fish preparation, 'important gatekeepers because what they put on the menu becomes available to a large number of consumers' and 'a segment where cod farmers might obtain the relatively high prices needed to develop their businesses' (Bjørklund et al. 2007).

Following the selection, the experimenters prepare the participants to be good experimental subjects. Study A relies on experimental economics techniques – namely, experimental auctions – to elicit participants' willingness to pay for different types of fish. The participants thus receive money to ensure they are able to purchase fish. They are also trained to ensure that they behave as rational economic agents and express their actual willingness to pay. This is in line with Teil and Muniesa (2006) who analyse the training of participants in similar economic experiments. The very laboratory room is designed to make participants act as individual consumers with their own preferences and opinions. As one researcher explains:

people are turned towards the wall or with partition screens in front, and they are in individual booths so that they do not influence each other, either with expressions or saying ‘mmmm,’ etc. [...] when you eat face to face, you absolutely cannot judge independently. (Interview 2)

Even in field experiments such as studies B and C, participants are prepared. The experimenters use written instructions and questionnaires to control how participants use the fish. In study B, ‘The consumers were asked to consume the farmed and wild cod on two consecutive days’ and ‘before Saturday 13th April’ (Luten et al. 2002, p. 45). The questionnaires that they fill in include a question about how they cook the cod.

The preparation also involves adjusting the experimental setting of the consumers. This is most striking in study A, which takes place in a lab, and where experimenters pick ‘experimentation times that could correspond to meals’ (Interview 5) and tell participants that they will be offered a full meal (more food is provided after the experiment so that participants have enough to eat). This is to make sure that not only the fish, but also the participants, are at their best.

Despite all the care devoted to preparing fish and participants for the experiments, irregularities remain. Both fish and people can be changeable and whimsical. Cod, one sensory scientist explains, ‘is never the same,’ and ‘from one day to the next – well maybe not in one day, but after a few days in keeping, it can change’ (Interview 5). Consumers’ preferences can also change from one day to the next, ‘Because [consumers] are not in the same state, because the day before they ate cod, so today it’s the second time they eat cod, they do not find it as good ...’ (Interview 5). Thus, from the outset of the experiments, one needs to deal with the variability of both fish and consumers.¹ The preparation of the experiments shows how much care this requires. The work of tracing, packaging, labelling, testing cooking methods, seasoning, instructing, timing, and so on, is not so much about suppressing this variability as it is about harnessing it: controlling it, and making something out of it. Besides the practical and logistical work that we have detailed above, one way to do that is to quantify both the fish and the consumers.

Pre-valuations: quantifying the fish and the consumers before they meet

In addition to the very concrete pre-modifications through which the product and consumers are brought into the experimental set-up, the experimenters carry out what we suggest to call pre-valuations. While they prepare the fish and the participants for the experiment, they characterise them quantitatively, redefining them according to sets of quantifiable attributes. In these pre-valuations, the fish and the consumers are kept apart. The experimenters are not interested in the commodity at this stage, but rather in the people and fish in themselves, each with their own characteristics.

Pre-valuing the fish

The pre-valuation of the fish focuses on quality understood as a characteristic of the fish itself, independent of its relation to consumers. In this case, quality is a material characteristic of the flesh of the fish. To quantify it, experimenters use tools that enable them to operationalise quality as a series of observable and quantifiable characteristics.

One such quality valuation is the ‘Quality Index Method’ (QIM) used in studies B and C. The QIM is well established in the literature and used in the industry to check the freshness of raw fish. The method is presented, for example, in Martinsdottir et al. (2003), and its application to cod in Cardenas Bonilla et al. (2007). Its implementation requires three things: a panel of experts; a fish; and a scheme associating characteristics of the fish to a quantified score. Distinct schemes are developed for each fish species. They direct the experts’ gaze towards specific parts of the fish (for example, its skin, its flesh, its eyes or its gills) and even to specific characteristics of these fish parts (for example, their texture, colour or odour). They also list possible descriptions of these characteristics. Having observed the fish, experts pick the description that fits best. For instance, referring to Cardenas Bonilla et al. (2007), does the fish smell ‘fresh, neutral,’ ‘seaweed, marine, grass,’ or ‘sour

milk'? Each possible description corresponds to a number – a 'score.' Having checked all the relevant characteristics, the expert panel obtains 'an overall sensory score' (Bjørklund et al. 2007, p. 56). Each sample of cod is thus modified into a number summing up its freshness. This operation makes the samples comparable, enabling experimenters to formulate hypotheses. For instance, in study C, 'based on the QIM assessment, the farmed cod sent to England could be expected to receive lower scores on freshness from the chefs' (Bjørklund et al. 2007, p. 58). This measurement makes some of the variability of the fish manageable through quantification and classification. However, it says nothing of the value of the commodity and of how it will be assessed, because contrary to the experts, the consumers are not guided by a standardised, explicit definition of quality.

Pre-valuing the consumers

When it comes to the people participating in the experiments, what interests the experimenters is their representativeness of the targeted population. Studies A and B use panels of consumers; the experimenters document their ages, genders and occupations and compare them to the general population. Using surveys on what they call 'attitudes and perceptions,' they also assess whether the subjects are reliable representatives of fish consumers: do they participate in food decisions for their household? How often do they buy fish?

To qualify the consumers, the experimenters also document how they define and evaluate fish quality. In studies A and B, they use surveys about how consumers assess fish quality, about what they consider important when eating fish, and about their opinions on fish farming and its impact on the environment, safety, price or quality. In study C, focusing on restaurant chefs, the experimenters also use in-depth interviews to inquire into the chefs' ways of assessing fish quality and into their views on fishing and aquaculture. However, here, as with the QIM methods, this says nothing of how consumers or chefs will value *one specific* fish: we do not know if this is actually how they assess fish quality when 'face to face' with the fish. In other words, we do not know if these pre-valuations of the fish and consumers still hold when the two meet.

In those pre-valuations, the fish and participants are kept apart. However, like the pre-modifications that set up the experiment, these pre-valuations are only performed in view of the core operation of the experiments: characterising what happens when fish and consumers meet. The fish and the people are pre-valued so that they can be used to value one another.

Tools of co-modification: when fish and consumer meet

Finally, in the experiments, consumers and fish meet: the consumers taste the fish. The consumers are equipped with tools of valuation – scales, instructions, training – that enable them to value the cod and explicate how they relate to it. These tools fall into two categories: tools for feelings and appreciation; and tools for monetary valuation. The experimenters call them 'hedonic valuations' and 'economic valuations,' respectively. Both play a crucial part in the co-modification of fish and consumers. In this section, we show that the use of these tools ascribes new characteristics to the fish and to the consumers, and that these characteristics are relational.

Let us start with the *tools for valuing feelings and appreciation*. After tasting the fish, the participants fill in scale-based questionnaires that list series of characteristics; for instance, in study B: 'unattractive – attractive,' 'bad color – good color,' 'dull – exciting,' 'dry – juicy,' 'unnatural – natural.' For each of these characteristics, the participants are instructed to give a value on a quantitative scale, typically from 0 to 10 or 0 to 7. These scales do several things. First, as Muniesa (2014) and Muniesa and Trébuchet-Breitwiller (2010) show in similar settings, they turn participants into self-measuring instruments able to translate their qualitative valuation into numbers. This is precisely why they are called 'hedonic': participants are asked to turn their attention towards their own feelings and appreciations. However, what we would like to underscore is that this operation is relational, in that the fish is part of the provocation of these feelings. Second, the scales perform a slightly different fish with new qualities. Here, the quality of the fish is not about its condition or about a technical

assessment. Instead, it is relational, in that it emerges when the participants and the fish meet. The scales are not only tools of valuation but also *tools of co-modification*: they make it possible for the participants to quantify how the fish affects them; this quantification then ascribes new characteristics to the fish, which can now be described as more or less attractive, more or less dull, and so on.

Tools for monetary valuation re-describe the fish according to one quality: willingness-to-pay. This variable corresponds to the maximum amount one consumer would pay to acquire the fish; it is specific to the consumer and to the product. The studies we consider use different tools to elicit it. In study B, the survey simply asks participants for an amount. Study A uses a more elaborate technique: the experimenters provoke situations where participants ‘have real economic incentives to reveal their preferences truthfully’ (Alfnes and Rickertsen 2011, p. 216).² They do so using auctions and choice experiments designed so that what is defined as the most rational strategy is to state one’s ‘true’ preference. In this setting, much like in those analysed by theorists of the performativity of economics (Garcia-Parpet 2007, MacKenzie et al. 2007, Çalışkan and Callon 2009, 2010), the participants perform as rational economic agents via the use of money, incentives, gaming instructions and training. This is considered necessary for a monetary value of the fish to emerge. Here again, the fish comes out of the experiment with new qualities: it acquires a market value in the small marketplace created in the experiment. The emergence of this fish with a market price depends on the modification of the participants by the experimental setting but also by the fish they taste, all of which make the participants’ expression of a price possible. Indeed, the ability of participants to express a monetary valuation stems from the equipment provided by the experimental setting, but also from their tasting the fish and assessing their feelings and appreciations towards it. In this case, too, monetary valuations are tools of co-modification.

This points to another way in which the measured characteristics of the fish-with-consumers are relational: they emerge in specific experimental conditions. The co-modified fish is performed by valuation tools in combination with the experimental conditions. The experiments are not designed to compare valuations from one person to the next, but to analyse how consumers value a product differently in different situations. For this, the experimenters use valuation tools in different set-ups, and compare the co-modified fish and consumers across these set-ups. Looking back at the staging of experimental situations analysed in section 5.1, we can see how the preparations actively take part in the co-modification process.

For instance, studies A and B test how the information on the package participates in valuations of the cod. Thus, different information is provided in each experimental session. In the first session no information on origins is given, whereas in the second and third sessions, some participants are informed about origins and production methods. In study B, the experimenters separate participants into several groups; some groups receive two fish labelled merely as ‘cod,’ some receive one labelled as ‘cod’ and the other as ‘farmed cod,’ and some receive one labelled as ‘wild cod’ and one labelled as ‘farmed cod.’ The question is then how these differences will affect the valuations resulting from the experiments.

Study A also makes the experimental set-up matter in a different way. As we explained above, one major concern in the preparation of experiments is to control the variability of both fish and subjects. In study A, this variability is incorporated into the relational valuation of the fish. The experimenters test how seasonal variations in the quality of fish affect consumers’ appreciation by organising sessions in the winter and in the spring. They also investigate the instability of individual preferences by organising and comparing two rounds of experiments with the same participants. This underlines our point that the codfish is constantly *acting with* the consumers and with the experimenters.

After the experiment: co-modified fish and consumers and the becoming of the fish-commodity

What emerges from the experiments? It is in fact a quite specific version of the cod: a quantified cod with a quantified consumer. To put it differently, the experiment modifies the cod into a quantified

entity – and the same happens to its consumers. To draw results and conclusions, the experimenters use statistical data processing to create tables and graphs that enable them to draw all the valuations generated in the study together. As a result of this work, yet another fish emerges: the fish as a commodity whose value is potentially enhanced. This fish only exists in relation to its potential consumers. This result is the purpose of the experiment.

This commodity-fish can differ significantly from the one measured and described before the experiment. Study B provides a rather funny example of this. There, sensory experts find that ‘farmed cod has a whiter color, looks more milky, is less juicy and is experienced as more fibrous during chewing’ (Luten et al. 2002, p. 58). From their perspective, focused on the flesh, there is a clear difference between farmed and wild cod. Yet consumers do not find such a difference: they ‘seemed to appreciate farmed cod as good as wild cod and occasionally slightly better for a very few attributes. These results did not follow the results from expert evaluation’ (Luten et al. 2002, p. 59). While technically different, after the experiments, wild and farmed cod can be considered as similar commodities: ‘the profile of farmed and wild cod, based upon attributes evaluated by consumers, is similar’ (Luten et al. 2002, p. 59).

The consumers, too, can appear different when relating to the fish. When the experimenters compare the consumers by themselves and the consumers with the fish, the two do not always match. They then have to reconfigure their idea of the consumers. The things that consumers actually care about when tasting the fish are not always the things they say they care about; or, to quote one of the papers from study B: ‘Actual behaviour in product evaluation does not match with self-reported explicit beliefs and attitudes considering what is important in eating fish’ (Kole et al. 2003, p. 30). For instance, study B finds that information on freshness does not affect the way consumers perceive the fish, even though participants indicate that freshness is one of the main characteristics that they consider when buying and eating fish. The way that the experimenters try to interpret this discrepancy is also revealing of the relational character of the valuations extracted from the experiment. Indeed, in their discussion of the results, they ask whether the discrepancy results from a lack of clarity of the information provided to participants, or from a lack of experience on judging freshness on the consumers’ part (Kole et al. 2003, p. 25). In other words, they wonder if the difference is about the product or about the consumers: the results are so tightly relational that it becomes difficult to set the two apart.

Turning valuations into valorisations: producing market-value

The experimental results lead to more general conclusions and recommendations about the cod as a commodity beyond the experimental sites. The experimenters handle generalisation carefully. They do not consider their results as describing cods and consumers in general, but rather as suggesting ways to enhance the value of farmed cod as a commodity. They use the valuations produced within experiments to suggest ways of valorising farmed cod – that is, using Vatin’s definition of transforming it in order to increase its value (Vatin 2013a). Thus, they draw ‘marketing implications’ (Bjørklund et al. 2007, p. 64), identify ‘opportunities and challenges for cod in the French market’ or suggest ‘possible strategies for cod’ (Rickertsen et al. 2016, p. 78). The conclusions include practical suggestions about how to work with the farmed cod as a commodity. These suggestions are about the cod in relation to its consumers and its markets. Hence, the commodity cannot be reduced to the fish: it is a relational entity resulting from the co-modification of a fish and its consumers. If we follow the conclusions from study C, a good commodity is one whose advantages are ‘exploited by seeking out consumers who value’ them (Bjørklund et al. 2007, p. 65) – and even by *making* consumers value them.

Information appears as a key device to act on both the fish and the consumers. It modifies the fish by making some of its characteristics apparent. For example, one paper concludes that, since ‘wild and farmed fish were perceived as best along different dimensions,’ ‘information can also be used to increase the value of farmed fish’ (Rickertsen et al. 2016, p. 78). Another states that,

‘since farmed cod is still relatively unknown in the marketplace, it is of paramount importance to communicate [its] advantages’ (Bjørklund et al. 2007, p. 65).

The same paper suggests instructing consumers about the right way to prepare farmed cod, so that it is at its most enjoyable. Having found that farmed cod needs less cooking than wild cod, researchers provide cooking instructions to prevent over-cooking that ‘could be a disappointment for consumers.’ They even call for more in-depth sensory studies on ‘the effect of cooking time on eating properties of farmed cod so that more specific advice can be provided to customers’ (Bjørklund et al. 2007, p. 65). It is necessary to take into account the distinct flesh of farmed cod, but also to change consumers’ habits to maximise their enjoyment of farmed cod: the paper suggests using information to co-modify consumers and cod.

Another suggestion for increasing the market value of farmed cod is to dissociate it from the overall negative perception of aquaculture. To this end, the papers suggest both modifications in production and on the marketplace, in which we see the imbricated concerns for the cod and for the consumers at play. Both studies B and C recommend improving the image of farmed cod by adapting production systems ‘towards positive consumer perceptions’ (Kole et al. 2003, p. 31) and by communicating ‘the benefits and realities of cod farming’ (Bjørklund et al. 2007, p. 66). On the market side, one article recommends repositioning farmed cod on the market: instead of associating it with the ‘farmed’ label, it should be positioned in a category that highlights its advantages or ‘its own particular added values.’ Further, in this repositioning of farmed cod, ‘the contrast with wild captured fish should be avoided’ (Kole et al. 2003, p. 31). This last recommendation has contributed to the rebranding of farmed cod as ‘fresh cod’ – a label that both erases the distinction between farmed and wild cod, and emphasises availability and quality (two key advantages of farmed cod) (Asdal 2015; Interview 9).

Conclusion

The experiments we have retraced may appear very weird – funny, even. But while our close descriptions emphasise their weirdness, this is not with a derisive intent. Indeed, the great work and care that experimenters devote to staging artificial valuation situations reflects the weirdness of commodification itself. Commodification, it turns out, rests on a myriad of mundane operations that seek to perform, on the one hand, stable, packaged and synchronised products, and, on the other hand, available, interested and readied consumers.

What our analysis shows is that the term ‘commodity’ does not make sense in isolation. ‘Commodity’ is a relational term, and commodities need to be studied as such both theoretically and empirically. The notion of ‘co-modification’ allows us to do so. Our point, then, is not to identify a specific *moment* when the fish becomes a commodity, but to understand *situations* where the commodity is discussed, assessed, redefined so as to produce its best possible version. This occurs in a relational process. This is not to say that co-modification is in itself a guarantee of becoming a successful commodity in the market. An interesting aspect of the Norwegian cod farming venture is how it eventually and indeed spectacularly failed (Asdal 2015). Again, as we noted above, co-modification is an analytical tool developed in order to better capture the commodification process, not a recipe for succeeding with it.

In fact, what we observe is a double process of co-modification. First, the things and consumers are co-modified: *both* are transformed by their encounter, and from this, a commodity emerges with new, relational qualities. Second, the production site and the marketplace are co-modified as the experiments work upon both the qualities of the commodities and the conditions of exchange.

Importantly, then, the experiments evidence the need as well as the possibility to look beyond the traditional categories of economic analysis, and especially beyond the age-old dichotomy between production processes and market exchange. This is useful, we suggest, as economic sociology, and even valuation studies, still tend to rely on these categories, most often with a focus on market transactions. In contrast, our site of study, along with our suggested empirical and analytical approach,

works across these divides and categories for the benefit of re-combining analyses of production and ‘marketisation.’

Notes

1. This does not necessarily mean suppressing it completely, but designing ways to take it into account or even fully include it in the design – for example, by investigating how consumers appreciate seasonal variations in wild cod quality, or by using the same consumers in two experimental sessions to see if variations in individual preferences affect the overall results.
2. Study A is led by economists, who consider that questionnaires are not a reliable way to elicit willingness to pay. Following the principles of experimental economics, they consider that you need incentives in order to observe what people would really do, as opposed to what they say they would do.

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