

Stories and the emergence of a market

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draft, comments are most welcome!

One important research area in economic sociology is how actors make decisions in situations of uncertainty. Research has shown that social relations, institutional conditions, and practices contribute to the reduction of uncertainty when making decisions. Actors' social and institutional embeddedness structure their expectations and actions in market contexts and thus allow for the coordination of action. Typically, research looks at already existing markets or studies the construction of a market from an *ex post* perspective. Yet how does the coordination of actions work in a market that is just emerging, in which it is unclear who are the relevant actors and relations, what are the products and what are the resources leading to success?

In this paper I show how actors leverage culture to deal with the uncertainties of newness in the emergence of a market. In particular, I show how the category “worthy” gets constructed collaboratively as its meaning is negotiated. For an empirical inquiry into such processes of creative friction, I argue for an inquiry into stories. With stories actors ascribe meaning and value to a new thing – be it a product, an actor, a process, a relation, a market. The empirical analysis focuses on the field of innovative breast cancer therapeutics in which a new market emerges. Complementing existing studies on the biotech industry, on

cancer treatment research, and on R&D strategies, the research project examines the stories of different players involved between the late 1980s until the mid-2000s. The market emerges without a product, but as a market of expectations about the future. It is the stories about the future that move the market. This research contributes on the existing literature on the role of discourse in the formation of markets by looking at the collaborative process of category construction from stories.

Theoretical framing

The market as a phenomenon has received increased sociological attention over the past decades. Rather than using “the market” in an abstract notion to explain different instances of market exchanges, economic sociologists have been seeking to specify the mechanisms through which the market is constituted by *noneconomic* factors.

A growing number of studies focus on a range of cultural and cognitive aspects that shape and construct markets and thus complement the traditional emphasis on structural networks (e.g. Abolafia 1998; Callon 1998; Callon, Meadel and Rabeharisoa 2002; DiMaggio 1994; Geertz 2001; Podolny 2005; Spillman 1999; Zelizer 1978). A vital area of research has evolved around cultural processes of classification and categorization of products and firms in markets (e.g. Zuckerman 1999, 2000; see also Breiger 2005; Negro, Kocak and Hsu 2010). In particular, studies on categorization processes have focused on how new markets get established.

Markets are social formations. As local bundles, they are rather small so that participants can watch and react to each other (White 1981). In their emergence, markets are at first cognitive formations, before they are social exchanges and before their characteristic monetary exchanges ensue. Markets arise from various (at first cognitively) connected elements, such as relations, processes, objects, actors (Çalışkan and Callon 2009, 2010). In the emergence of a new market, potential market members are faced with a completely unstructured setting with extreme ambiguity (Santos and Eisenhardt 2009), in which it is unclear who will participate with which products and what will count as worthy (Stark 2009). In general, the ambiguity is about the “new”. Newness is both something that does

not fit into the existing categories of the particular context, the uncategorized, as well as a quality ascription, the particular worth.

In such an ambiguous setting, firms need to establish themselves as belonging to a legitimate category to be recognized and to be “counted” (Kennedy 2008). Buyers and sellers may connect to the same product when they share categories of evaluation (Rosa et al. 1999). Categories thus help to make sense and to give meaning to market elements. To be sure, categories are not permanently fixed; rather, they remain flexible as their meaning may change over time.

Yet how does a category get constructed? Relational sociology suggests that “context” is of primary importance for meaning to arise: in social and temporal context actors are able to establish meaning and make decisions on the basis of social comparison and imitation (Abbott 2007; White 2002). This echoes White’s seminal idea of a market: producers who consider themselves equivalent watch and react to each other. In order to establish similarity, and thus an idea of whom to watch and to compare against, market participants are involved in the telling of stories. It is stories that help to shape and to maintain social structures. As people or organizations act, they create accounts or stories. Stories constitute actors, as they come to know who they are with and against others; moreover, stories also serve as signals to others, to make sense of what others are about. Stories then are the ties, which connect actors and actions over time and help to constitute each actor’s identity (White 1992, 2008). For nascent markets, Kennedy (2008) elaborates these insights when he looks at firms creating associations by mentioning other firms or products in news stories. His work thus not only shows the central role of news stories in market formation (see also Kennedy 2005) but also how a market category emerges by connections, creating a cognitive market network.

My research extends this line of work by looking at the collaborative process of category construction from stories. A qualitative inquiry into the stories of potential members of a new market as the context evolves allows the tracing of a collaborative category construction. It sheds lights onto both successes and failures in the category construction. Such a collaborative process will not be friction-free; indeed, rivalries and dissonances are

conducive of creativity (Stark 2009) and, in turn, of category construction. Much like in Leifer's interaction preludes (1988), no individual firm is able to claim to have a worthy product or to be a worthy market participant. In the ambiguous setting of a nascent market this gets negotiated collaboratively in struggles and agreements.

Stories here refer to public narrations of individual actors voiced towards the outside (as opposed to organizational stories directed towards the inside). These stories may be found in press statements, newspaper reports, or analysts' reports. Such stories told can be backward looking to evaluate what has happened: they reflect successes and failure (Deuten and Rip 2000), convey knowledge and create communities (Bragd et al. 2008; Czarniawska 1997). Stories can provide frames for making sense of the past and future (Fiss and Hirsch 2005). Stories can also be directed towards the future; then they are filled with expectations about an unforeseeable future in an attempt to cope with uncertainties. We find such future-oriented stories in contexts in which something new is "arising", when it is unclear what the new may be a case of (Kennedy 2008) or who legitimate actors are (Lounsbury and Glynn 2001). Such stories then are provisional narrations, which may change over time. Indeed, the same actor may tell a different story at different times and to different others and thus signal different strategies and multiple identities. In turn, such category flexibility offers potential for a priori unforeseen entrepreneurial activity (Leifer 1988; Padgett and Ansell 1993; Stark 2009).

Market for innovative breast cancer therapy research

This research focuses on such future-oriented stories of actors involved in the emerging market of innovative breast cancer therapeutics research. The de-coding of the human genome marked a definite shift in cancer research from surgical and destructive treatments of tumors to genetically engineered, targeted therapeutics: with better understanding of tumor development, innovative research on treatment now combines insights from genomics, proteomics, molecular biology, and bioinformatics. Especially proteins and monoclonal antibodies but also advances in gene therapy are believed to deliver products, which may be able to *control* cancer, much like how diabetes has become a controllable illness.

This worldwide field is characterized by high uncertainties in terms of research strategy and costs for R&D as well as by high expectations in terms of economic returns once the institutional gatekeeper, the FDA, approves a molecule.¹ The industry continues to have high hopes that a widely working, non-toxic treatment for breast cancer, which each year continues to be deadly for 70,000 women in Europe alone², will be found within the next couple of years. Accordingly, competition between companies is intense as each seeks to find the blockbuster cure while also striving to hit a financial jackpot.

The analysis is based on press releases of companies, newspaper and industry reports, scientific reports as well as accounts from financial analysts on the field of innovative breast cancer research. In a first step, I reconstructed the scientific discussion on innovative cancer therapy with the help of *Nature* and *Science* since the mid-1980s and matched the different biochemical research approaches to more general research strategies. I checked this match with experts in the field and the oncological literature. “Target-specific breast cancer therapy” exhibits four different research strategies: one strategy concentrates on the extracellular environment, the second on the interstices between the extra and intracellular environment, the third on the intracellular environment, and the fourth uses a multi-target approach.

In a second step, I identified all companies, which had been mentioned as involved in working on innovative, molecular mechanisms in cancer therapy since the start of the scientific discussion. Such explorative procedure allows me to take into account companies, which were once active though at later times merged or dissolved.

Based on these two steps then I conducted database searches (*LexisNexis*, *Factiva*, market research databases) in press releases, reports by journalists and financial analysts on

¹ Food and Drug Administration (FDA) approval is crucial. As discussed in the biotech industry, the difficulty arises in particular in Phase II and III of the FDA approval regimen. European drug regulatory authorities (The European Medicines Agency, EMEA) use slightly different procedures to determine an acceptable point for drug approval. However, there are no targeted therapies so far approved in Europe and not in the US.

² Figures for Europe are steady over the last decade. For example, in Germany, there are 55,000 new cases of female breast cancer per annum.

companies, which are conducting research on innovative cancer therapy mechanisms. I took into account all companies, which themselves claim that they are working on a molecular cancer therapy, which could be effective in the case of breast cancer, or which analysts ascribe such a potential.³ On the basis of a content analysis, I developed a matrix of companies by research strategy over time. This is the structural foundation of an emerging market; the stories companies tell are the backdrop for that.

The following analysis reconstructs one aspect of market emergence of innovative breast cancer therapy research as it evolved between nine North American, British and German companies at the beginning of the 1990s until 1998. The analysis pays special attention to reports of biotech companies themselves, their financial analysts, and in turn the ensuing reaction of different market participants. Communication about different research strategies serves as a heuristic to understand companies' positioning in the emerging market (Penan 1996). Stories about the chosen research strategy and its expectable results function as signals, which competitors interpret and use to orient their own actions in a next step. Excerpts from these stories highlight the attempts of positioning and category formation.

Stories of market formation

Fundamental for developments in genetic cancer therapy is Genentech (founded 1976, IPO 1980, San Francisco). Already in 1989 Genentech successfully developed molecular antibodies, which prevented vascular growth and therefore also the growth of cancer cells. In 1991 Genentech conducts first clinical trials and declares (Business Wire 1991):

“The preclinical data are very strong. We're hopeful that the human therapeutic effect of the HER-2 antibody's interference in tumor growth will be confirmed.”

In the early 1990s, Sugen (1991, IPO 1995) another Silicon Valley biotech company, detects a crucial mechanism to block cell signaling, however, without entering clinical trials. At about the same time, Canadian company Biomira (1985, IPO 1988) begins to develop proteins, which can deliver antigens into the cell for purposes of therapeutic immunization. In 1992 Biomira starts phase II clinical trials (PR Newswire 1992):

³ In 1990, five companies were part of that group; by 2000 there were 60 companies.

“Having treated 24 patients with our Theratope formulation we believe the Phase I studies show that the product is safe and stimulates their immune systems to respond against the cancer antigen.”

At the beginning of the 1990s, especially British companies follow the leads of the North American competitors.⁴ Since 1992 British Biotech (Oxford, 1986, IPO 1992) is developing a novel enzyme inhibitor, which would “limit tumour spread, particularly in highly invasive cancers such as breast, lung and ovary” (Daily Mail 1992). As the first product of this biochemical mechanism, Batimastat successfully completes phase II of clinical trials. The research strategy in general follows that of Genentech in attacking the extracellular environment. According to British Biotech, Batimastat is “a potential blockbuster drug” (Skeel 1994). Similarly, financial analysts evaluate Batimastat very positively (Lumsden 1994):

“If Batimastat proves helpful in treating ovarian cancer, it is also likely to be useful against a wide range of other cancers – and this is what has driven the share price to its current peak. With 6 million cancer sufferers in the US and Europe, the group could have a blockbuster.”

Analysts estimate Batimastat’s potential sales until 2000 to range in the US \$ 250 million (McCrone 1994) – and with such estimates stock prices rise. Beginning with phase III tests for Batimastat in November 1994, British Biotech announces an improved product, which works with the same mechanisms and can be taken simply as a pill: Marimastat, which should begin human trials in 1995.

In January 1995, the biotech company Chiroscience (1992, IPO 1994) announces that following the same mechanism, it has developed a more effective product than British Biotech (Daily Mail 1995). British Biotech, however, reports strong side effects from Batimastats phase II trials and as a result suspends the trials. British Biotech’s stock prices

⁴ In the mid-1990s, there are 475 biotech companies in all of Europe, of which 100 are biopharmaceutical companies developing medical agents. In comparison, of the 1300 US biotechs, 800 work in the biopharmaceutical area (Ernst & Young 1995).

fall sharply. The founder of Chiroscience uses the opportunity of the weakened competition to promote his company in a press release (Pharmaceutical Business News 1995):

“We have the best pipeline of any emerging pharmaceutical company with a research programme that will give us the blockbuster drugs of the future.”

However, British Biotech counters promptly and starts with phase II for Marimastat in May 1995. Positive preliminary test results for Marimastat and the promise of further human trials let stock prices and the analysts’ expectations rise once more (Alexander 1995):

“British Biotech, though it is not claiming anything as headlinish as a 'breakthrough' in cancer treatment, made a presentation to City analysts about its drug Marimastat. It left some of them clawing the air. The shares rocketed from 1043p to 1548p. A breathless Ian White of Flemings [Investment banking] hastily penned a manuscript note for clients. It is the 'opportunity of the decade', he scribbled. The last time he wrote what he calls a four-star note was just ahead of Glaxo's launch of Zantac, which proved to be the world's most profitable drug.”

Given the estimated annual sales of more than 600 million British Pound for the finished product, London’s financial world finds itself in a frenzy (Stevenson and Wilkie 1995):

“The City has whipped itself into a frenzy in the belief that it can cash in on the holy grail of medical research – a cure for cancer. In their scramble not to miss out on the billions to be made from a cure, investors are brushing aside warnings from the medical establishment that it is too early to tell if a breakthrough has been made.”

In April 1996, Chiroscience yet again declares that animal tests show that “our product is better than Marimastat” (Extel Examiner 1996). Financial analysts thereupon advise to buy Chiroscience stocks, whose value increase rapidly. Also in April 1996, the US firm Agouron Pharmaceutical (La Jolla, IPO 1989) presents its preclinical studies, which show that working on the same mechanism, it too has a better product than Batimastat in the pipeline (PR Newswire 1996).

In May 1996, phase III tests for Marimastat begin. Financial analysts react enthusiastically to this development: “We think it’s going to be a major cancer product” (Davidson 1996).

Stocks rise very high and British Biotech is for a short while a company without a product worth US \$ 2.5 billion.

However, the scientific community criticizes the presented results from the clinical trials: they are based on falsely collected data, which measure natural variation and not, as claimed, a stop of tumor growth (Anonymous 1996). Financial analysts, in turn, blame British Biotech with deceit, and although British Biotech goes on to defend itself – “We have been careful what we have said. We never claimed Marimastat is a cure for cancer, but we hope it will be a useful treatment“ (Blackstone 1996) – stock prices fall. In November 1996, British Biotech stops the development of Batimastat.

At about the same time, three other UK biotechs try to find their position in the emerging market for innovative breast cancer therapeutics. Cyclacel (Dundee, founded 1996 with capital from one of the co-owners of Chiroscience) promises to modify and suppress cancer growth with a “potentially revolutionary approach”, the protein p53 (The Times 1996). Oxford Biomedica (1995, IPO 1996) announces yet another strategy to tackle tumorous growth: the destruction of tumor cells with the help of gene therapy. Antisoma (London, 1998, IPO 1997) works on an immunotherapeutic agent. In fall 1996, the German company Medigene (Martinsried, 1994, IPO 2000) enters this market and works on immune therapy.

Marimastat’s clinical trials are taking longer than planned and the results are not satisfactory. Financial analysts waver between high expectations and pessimism. On the other hand, Genentech announces in a press release successful results from phase III clinical trials (Business Wire 1997):

“The anticancer activity of the investigational Herceptin monoclonal antibody may result in both slowing the progression of the cancer and increasing the percentage of women who experience tumor shrinkage. Although not a cure, these encouraging results in women with metastatic breast cancer suggest that better control of the disease may be possible.”

Chiroscience and Agouron enter phase II of clinical trials with their products; contrary to British Biotech, they partner up early on with pharmaceutical companies (Bristol-Myers

Squibb and Roche). In April 1998, analysts view Chiroscience as more successful than British Biotech (Manley 1998), since Chiroscience's cancer therapy offers less side-effects and better usability. The pressure to deliver better results from clinical trials shakes up British Biotech: the company's management leaves over disputes about publication of trial results, there are legal investigations regarding the accuracy of press statements and insider trading (Massod 1998). As a result, British Biotech has lost its credibility and stocks nosedive completely (Frankfurter Allgemeine Zeitung 1998).

Analysis of market formation

The study of the first few years of the emerging social formation shows that first and foremost actors exchange expectations about the future prior to the existence of any product as such. They tell stories of how new and worthy they are and instigate interest for their research strategies. I find that such stories are part of a category construction what "worthy" means in that nascent market.

It is helpful to think about the negotiations over meaning of worthiness in terms of a "trading zone" (Galison 1997). A trading zone is a domain in which different actors from mutually incomprehensible cultures come together to "trade" objects of interest – in this case, the meaning of worthiness. They "can agree on rules of exchange even if they ascribe utterly different significance to the objects being exchanged; they may even disagree on the meaning of the exchange process itself. Nonetheless, the trading partners can hammer out a *local* coordination, despite vast *global* differences" (783). They do so by developing a "pidgin" for these negotiations, which allows them to agree about the object temporarily and create an understanding of what it means to be worthy – they collaboratively construct the category "worthy". Outside of this trading zone, their understandings and their use of these objects may differ. The notion of trading zone focuses on the use of interpretations, entailing dissonance and misunderstandings.

For the members of the emerging market the category "worthy" serves as a quality and a focal point of interest. The trading zone, in which meaning gets negotiated and from which the category "worthy" gets constructed, consists of biotech companies, the pharmaceutical

industry, scientific community, financial analysts, as well as regulatory agencies. When tracing the stories told, it becomes apparent that different actors attach different meanings to the quality “worthy” since they have different focal points. For financial analysts “worthy” means a quality with which to generate funds; for scientists it means a breakthrough or stable results in clinical tests. Despite these different meanings attached, they are able to promote new products, new companies, and themselves.

The first phase of development is finished with Herceptin’s⁵ approval in September 1998. In this first phase, companies primarily followed two research strategies. British Biotech and Chiroscience directly compete with each other using the same agents and targets. The settled story on the enzyme inhibiting mechanism enables both companies a temporary identity formation and positioning in the market. The media’s attention around British Biotech’ study results had stock prices rise and stirred further expectations regarding financial gains and medical breakthrough.⁶ Both companies use the growing expectations to secure their financial resources.

Some of the stories told were identified by other market participants as lies and were, in turn, replaced by new, negative stories. Biotechs such as Chiroscience, who employed a strategy of explicit imitation (Tarde 2003) in their stories when following successful competitors in their biochemical mechanism, and on the other hand told a story of a separate and different entrepreneurial entity, were able to benefit from their story strategy. Other companies, such as Antisoma or Biomira, followed a strategy of anti-imitation, i.e. an oppositional narrative positioning in the emerging market.

⁵ Herceptin (trastuzumab) is a recombinant humanized mAb developed by Genentech (South San Francisco, US) and co-owned by Roche (Basel, Switzerland). It has shown efficacy in treating metastatic breast cancer, which express particular protein of the epidermal growth factor family regulating cell growth (HER2). Herceptin blocks HER2 activity by binding to the part of the protein located on the outside of breast cancer cells and thereby stops the tumorous cells from dividing and growing. About 20-25% of metastatic breast cancers overexpress HER2.

⁶ In their study on the causal relation between media stories and stock prices of biotech, who specialize in cancer therapy, Huberman and Regev (2001) are able to show a direct connection.

Results of clinical trials served as reality checks. Positive results were financially, albeit temporarily, rewarded; negative results led to negative news and thus a change in the stories told.

In the pharmaceutical world, clinical tests supervised by the FDA serve as proof of reliability. Only when first genetically engineered cancer products proved to be reliable in clinical test in the late 1990s, could they serve as “game-changers” for the entire industry – which then oriented itself towards new targeted therapies and managed to receive new financial investments. New molecules and new therapeutic forms then became familiar to patients, doctors, companies, analysts, and investors. In their stories, biotech companies, the scientific community as well as financial analysts were able to connect innovative molecules to a brighter future for cancer patients. As opposed to standard invasive treatments, innovative molecules turned cancer into a treatable disease and thus offered new possibilities in health care. Temporarily, that was the meaning of the category “worthy”. Yet not all new molecules proved to be reliable, many failed the tests of the FDA.

Once a working, reliable product against breast cancer was approved in 1998, the market changed. While one company now had actual returns from product sales, its competitors continued to focus on future expectations. After 1998, new actors are entering the market, which then changed into a market with multiple focal points. While in the beginning of the developments, only few companies were involved following different research strategies, in the 2000s the research field became crowded as more companies worked on similar strategies. As new product categories, new actors and relations emerge, this market continues to be in the making.

Emergence of a market

In their research to find a “wonder drug against cancer” biotech companies follow different strategies in order to find the most successful therapy against tumorous cells. The choice of research strategy depends on several factors: financial resources, personnel make certain strategies unlikely; companies may experiences normative and cognitive lock-ins (Grabher

1993), “imprinting” (Stinchcombe 1965), in relation to founders educational background, may also influence such choices.

This paper suggests that such choices do not occur in an atomized manner, but follow a relational logic. Biotech companies are embedded organizationally in networks of cooperation and strategic alliances as loci of innovation (e.g. Malerba and Orsenigo 2002; Orsenigo, Pammolli and Riccaboni 2001; Powell, Koput and Smith-Doerr 1996; Powell et al. 2005). Moreover, as was shown, observation of competitors also play a fundamental role in the choices on research strategies. In their stories towards the outside, such as press releases, companies tell other market actors stories on where they see themselves and others. Stories of economic actors tell about how they evaluate their situation, their context and how they act accordingly. The market-without-a-product experiences highs and lows because of the stories told by firms and analysts. Through these stories, in turn, new categories are constructed.

In general, my analysis illuminated the interpretative work necessary for the emergence of a market: I highlighted the role of discourse as the principal medium of a market, which is understood as a social construction created, used, and reproduced by participating actors. This work contributes to recent developments in the opening in economic sociology towards cultural sociology, when focusing on the role of cognition and stories to explain how markets emerge, how they are maintained, and how they change.

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