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Selection Processes and Appropriability in Art, Science and Technology

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Abstract. Recently, there has been a mutually beneficial interchange of models and ideas between the sociology of science and the economics of technological innovation. Concepts such as the "paradigm" and the "network" seem to lend themselves to useful application in both fields. To these is added the concept of the "selection system". The major aim of this paper is to show that the development of the arts can be described using the same conceptual framework. This allows the development of hypotheses concerning the relationship between art, science and technology, and also about the effect of appropriability conditions.

Key words: Art, science, technology

1. Introduction

It is not necessary to adhere to social-constructivism to recognize that it is impossible to define categories such as technology, science and art in an essentialist manner, giving a list of characteristics that define the category unambiguously, exhaustively, and for all time. However, the problem of categorization is clearly important. This can be illustrated by celebrated instances such as the 1936 case in which the U.S. customs officials refused to recognize sculptures by Arp and others as art (no import duties) but stubbornly categorized them as utilitarian objects or raw materials (40% import duties). Also, advances in modelling patterns of change in any of the above-mentioned domains must be preceded by indicating the boundaries of the domain. Even more than in the economics of innovation or the sociology of science, this problem has been recognized in cultural economics in which the question in what respects works of art differ from other goods figures prominently. If works of art are considered to be different from all other goods, the applicability of the models and concepts of "normal" economics is put in doubt; if art is not basically different, the legitimacy of public policies specifically directed towards the arts becomes questionable.

This paper attempts to show how the debate about the difference between art and other goods can be clarified by introducing science into the comparison. To achieve this, use will be made of four fundamental concepts: networks, paradigms,

appropriability conditions, and selection systems. The participants in competitive processes can be considered to form a network. The competitive positions of the participants can be described in relation to a paradigm. Appropriability conditions determine how well specific positions can be made profitable to their inhabitants and protected against competitors. Finally, the way in which winners are separated from losers in the competitive process in a particular network can be called the selection system.

In the next sections the concepts of selection system, network and paradigm will be discussed more extensively, first in relation to industrial economics and later in relation to science and art. Although the crucial subject of this paper remains art, much attention will be devoted to technology and science, precisely to find out how or why art is dissimilar. To keep the picture relatively simple the argument will restrict itself to the visual arts.

It will be demonstrated that the same concepts can serve to describe developments in industry, science, and art. Particular networks, whose output can be defined in terms of paradigms, are subject to particular (mixes of) selection systems. The distinction between pure and applied science, as well as the distinction between avant-garde art and all other products of the cultural industries, can be explained in terms of different selection systems. Also, both the boundaries between industry, science, and art, and the nature of the selection system can be seen to be determined by the appropriability conditions, especially those safeguarded by the laws of intellectual property. Thus, it appears that public policy not only treats the arts differently, if works of art are considered to be different from other goods, but public policy also causes the arts to be more or less different.

The main claim put forward by this paper is that the proposed framework serves to explain the boundaries between the broad categories: industry, science, and art. The framework also suggests a new way of looking at and describing the microdynamics in particular networks within each category and, as will be shown, the framework lends itself particularly well to evolutionary or game-theoretic models in which specific competitive positions are more or less successful and are more or less defensible against competitors. In the next three sections I will focus on the description of competition and the explanation of success in industry, science, and art. The fifth section will explicitly discuss defensibility, the appropriability of the successful position, and its effects. A final section will provide an indication of the pretensions of the framework with respect to its use in further research.

2. Selection Systems, Networks, and the Technological Paradigm

Three different ideal-types of selection systems can be distinguished: market-selection, peer-selection, and expert selection (Wijnberg, 1994). In market selection, the ideal type of which is the perfectly competitive market, fitness is determined by the characteristics of an "impersonal" environment. In biology, this type

of selection is called natural selection. Peer-selection means that the group of selectors and the group of those to be selected are essentially the same. The nearest, admittedly imperfect, analogy in biological theory is sexual selection. In expert selection, a special evaluative capacity is attributed to a relatively small group of selectors who are not members of the group in which the selection process takes place. In biological evolution this occurs when humans start selective breeding programmes to select for a type of animal or plant that seems attractive or useful to the breeders.

The term "network" originated as a sociological concept to describe the relations between a group of "actors". Economists have adopted the term network to describe relations between enterprises. On the one hand they applied it to vertical relations, for instance, between suppliers and assemblers. On the other hand, network analysis seemed useful to analyze relations between "structurally equivalent" (Burt, 1987) players. The subset of structurally equivalent actors can also be considered as a network. This network is a social system in its own right with its own internal dynamics and its own "rules", mostly informal and often even unconscious, that serve to perpetuate its separate existence. Networks compete against other networks of the same and of other categories for the allegiance of its members to its rules, and therefore for their perpetuation (or reproduction).

The essential unit of analysis in industrial economics is the industry, the group of enterprises that are directly competing with each other. Being in competition means that the strategic behaviour of the one may cause the other to change its behaviour. Thus, the industry can be considered to be a network of structurally equivalent enterprises.

Scientific communities are groups of scientists working in the same field and taking notice of each other's work. Similar to the enterprises in an industry, the scientists in a particular community can be considered to be in competition and inhabiting a network of structurally equivalent actors. Finally, artists too can be considered to inhabit networks or artistic communities of those artists whose work "interacts" with that of their own. Some of the most famous communities of artists have been given specific names, e.g the abstract expressionists.

Some scientists are employed by industrial corporations instead of by universities or research institutes. One can ask when these scientists should be considered part of the scientific community. One can also ask whether all artists should be considered members of the artistic community, defined in this way. In the next two sections, I shall attempt to show that both questions can be dealt with by looking at the selection system that is relevant to the particular scientist or artist.

The recent popularity of the term paradigm started with Kuhn's (1970) proposal to consider the history of science to consist of relatively long periods of "normal science", operating within the confines of a specific "scientific paradigm", alternating with "scientific revolutions", introducing new paradigms. However, Kuhn's use of the word "paradigm" was, at least, ambiguous. Its meaning ranged from actual experiments, theories or artifacts which served as guiding examples to all scientists

in a certain field to a complete set of ways of identifying problems, searching for solutions, and expressing and evaluating results.

Economists explicitly invoked Kuhnian ideas to describe technological progress. Dosi (1982) introduced the concept of the *technological paradigm*, defining it as

> . . . a "pattern" of solution of selected technoeconomic problems based on highly selected principles derived from the natural sciences, jointly with specific rules aimed at acquiring new knowledge and safeguard it, whenever possible, against rapid diffusion to the competitors. [. . .] A technological paradigm is both an *exemplar* – an artifact that is to be developed and improved. . . – and a set of *heuristics*. . . (Dosi, 1988, p. 1127).

Furthermore, he defines a *technological trajectory* as ". . . the activity of technological progress along the economic and technological trade-offs defined by a paradigm."(Dosi, 1988, p. 1128).

Dosi's definitions, just as Kuhn's, leave room for much ambiguity, with respect to both scope and content. The scope of the paradigm should be defined as the relevant network of actors. Above, it was already established that the relevant network in economics should be the industry. Therefore, the technological paradigm should be considered to be industry-specific, at the same time representing an implicit agreement between producers and consumers/users about the nature of the good or service and forming the basis of (technological) competition between the producers. In this way, the concept can be used much more effectively to describe the nature of competition and the course of technological development in specific industries. A new paradigm means a new industry and vice versa, even though the exact identification of both may take time.

With regard to content, the first part of the definition by Dosi focuses on heuristics, giving priority to certain problems and looking in certain directions for solutions. The second part of the definition explicitly combines heuristics and exemplar, while his definition of the trajectory seems to be much easier to understand if the paradigm is understood as an exemplar. If one takes users/consumers into account, it seems sensible to consider the paradigm-as-exemplar as a "standard" as appreciated by consumers, the "average" specimen of a specific class of products at a certain moment in time.

This "average" specimen does not have to exist in reality. For example, the "average" car in the minds of car-buyers would be like the common denominator of several middle-class cars: a Ford, an Opel, a Toyota etc. An expensive or fast car would be more expensive or faster than *that* car. Also, the meaning of the concept should not be restricted to narrowly-technical characteristics. The characteristics that are relevant to the consumer should be the relevant dimensions of product-space, including price, after-sales services, and even purely psychological effects such as may be provided by a persuasive advertising campaign.

The paradigm is the cluster of characteristics which represents the "average" offering of the industry at a certain point in time. Ideally, the researcher should determine the paradigm by conducting a consumer survey. If that is impossible, the researcher could start by taking the most relevant product dimensions from, for instance, a consumer report. She could then make the reasonable assumption that consumer preferences have a more or less normal distribution and calculate the average of the scores of the different products, weighed according to sales volume. The position of a product an individual enterprise offers on the market can then be described in terms of the distance to the paradigm along all relevant dimensions of product-space. The profitability of a particular position is determined by the attractiveness to consumers of the particular area of product space and by the population density (of competitors) in that particular area. Profitability will of course attract competitors. Any product, for instance a music CD, that proves popular will cause competing record companies to attempt to lay hands on the music, the singer or the band or search for similar artists or similar music.

The defensibility of a particular position is determined by the appropriability conditions. For instance, the patents covering essential parts of the production process necessary to inhabit the particular position. Or, in the case of the music industry, copyright covering the music, long-term contracts binding the artists etcetera.

The paradigm is not a constant during the lifetime of the industry but changes continually and the pattern of those changes constitutes the technological trajectory. The technological trajectory represents technological change in time as seen through the eyes of the consumers, the ultimate selectors of the market place[11].

Describing industrial development in terms of changes in the paradigm and of the positions the producers inhabit relative to the paradigm, lends itself well to evolutionary and game-theoretic modelling of the microdynamics. Evolutionary models such as Nelson & Winter (1982) largely ignore the demand side. Enterprises have fixed routines, making them innovators or imitators. Selection takes place in a particular type of environment with respect to the availability of new technological knowledge. The realism of such a model could be greatly enhanced by having the enterprises inhabit particular positions in product space and incorporating not only the choice between innovating and imitating in the routines but also the direction in product space where an innovator would go and the direction in which an imitator would look for something to imitate. The paradigm could be defined, in such a model, as the weighted average of the positions, and success, in terms of profitability or sales, would be a function of the distance to the paradigm and population density. Individual success determines the means to innovate or imitate, the sum of individual successes and failures determines the path of the paradigm in time. It is evident that such a way of describing competition also fits in with game-theoretical approaches in which the payoffs of each possible action is dependent on the moves of other players and on the sum total of the effects of all moves.

3. The Scientific Paradigm

Science can be understood as a competitive process in which scientists attempt to successfully market scientific products. Published papers are the best equivalents of products. A major difference with industrial production is that here the dominant type of selection is peer-selection. Consumers are also producers, fellow-scientists: the editors and referees of journals, other writers who quote you and use your models and theories. The paradigm is the "standard" scientific product against which all products are measured in a specific scientific field, *in a specific network of scientists that is comparable to an industry or an artistic community.*

An acceptable paper has to conform to certain standards with regard to originality, mathematical rigour, statistical analysis, the nature of acceptable qualitative proof, thoroughness of the review of prior literature, socio-sexual awareness as for instance shown by describing actors as "she's" etc. All of these requirements are nothing else than the expression of the consumer preferences of the consumers of science. They change in time, they differ from field to field and from journal to journal. Scientists can give examples of what they consider perfectly average papers in their field. These papers "define" the current paradigm and its most important characteristics can be considered the relevant dimensions of product space. A paper that scores worse with regard to the most important characteristics, *in the eyes of consumers*, is not or only barely acceptable in journals and will be seldom quoted. A paper that scores better will have a much higher probability of being published and quoted. The scientific paradigm will gradually evolve in time and its normal progress could be called the scientific trajectory, in analogy with the technological trajectory.

A radically innovative scientific discovery may have the effect of so dramatically altering consumer preferences that the dimensions of product space change. This is what happens in a Kuhnian revolution. However, as Lakatos and others have argued, competing paradigms or research programmes may continue to exist along each other for a long time, just as old and new styles in painting or music may coexist long after a stylistic revolution has taken place.

As my co-authors and I (Debackere *et al.*, 1994; also Wijnberg, 1995) showed, the development of technological and scientific trajectories are interrelated. The networks are competing social systems. Typically, a few isolated individuals, either employed by industry or not, start working on similar problems with roughly similar ideas and when they take notice of each other a network comes into being with ties that are much stronger than the ties binding the individuals to the organizations they formally belong to. As the community grows, a new paradigm comes into being which is seen as competing with an older paradigm by the higher-level network of the (sub-) discipline. The community tries to organize congresses and found journals to be able to steer the selection process (see for instance Hull, 1988, for well-documented examples). If the work of the new community seems interesting from a commercial point of view, some scientists may be recruited by enterprises,

some who already work within industry are allowed to openly devote their efforts to the new field. Finally, some scientists may decide to become entrepreneurs themselves.

A new industry comes into being or an old industry may restart its life-cycle; in any case, a new technological paradigm has been created. Usually, consumer preferences in the market are not yet sufficiently clear to allow enterprises to give very strict briefs to the researchers in their employ. The network of researchers remains intact and transcends organizational boundaries. The scientific paradigm remains the standard of excellence for industrial and non-industrial researchers. Open and speedy communication remains the norm, even though researchers may at the same time strive to obtain property rights to their ideas (patents etc.). However, the (successful) industry grows further, consumer preferences "crystallize", many innovative small companies have failed or have banded together to achieve scale advantages in production, marketing, *and research.*

This is the point where the selection processes for industrial and non-industrial research start to divide. The enterprises which have survived the first phase of industrial growth have a much clearer view of their position in product space and of the R & D needs to strengthen this position. One effect of this is that the original R & D community is broken up while it is in itself in its expansion phase. The researchers in industry are obliged to let their work be dominated by the technological paradigm, not the scientific paradigm. They collectively stop forming an integral part of the scientific network, although some individual researchers in industry may still remain inside the scientific network. For the researchers in industry, the norms and requirements of their own organizations predominates over the norms and requirements of the network of researchers. If the new scientific paradigm is successful, "consumer preferences" in the new field will become clearer. Editors and referees will have stricter ideas about what they want of papers. The process of peer-selection fully comes into its own. Also, the new paradigm will attract many new researchers and, in complete analogy with strategic group formation in industrial development, groups of researchers will increasingly tend to cluster in specific parts of product space. The most easily observed aspect of this development is the proliferation of scientific journals in the new field, each with their own specific interests and "quality" requirements.

The whole process is again agreeable to a game-theoretic or, especially, evolutionary, description of the microdynamics in which success is a function of the fitness of the position in product space relative to the paradigm and the population density and in which the paradigm changes as a result of the sum of prior successes and failures of the members of the network.

It is important to realize that the different selection systems which operate in science and industry are themselves caused by historical contingencies. The market system as it operates in modern industries is a relatively recent development. There is no a priori reason why science should be dominated by a peer-selection system. As is well documented, the history of modern science moved very slowly and

hesitatingly towards this system. The *scientific* validity of the results of early-modern experimental research depended heavily upon certification by scientific patrons or self-professed amateurs of high social status, not of the members of the emergent scientific communities as such (Shapin, 1989; Biagoli, 1993). For another counter-example one has only to think of societies in which the development of science is steered by the wishes of political or religious functionaries. The peer-selection system of western science did not accept Lysenko's theories but in the Soviet Union of 1950 they were considered to be very good science because in full harmony with Marxist doctrine as understood by the party ideologues of the moment.

Another point worth making here is about the confusing issue of pure and applied science. Neither the motivation of the researcher, nor the characteristics of the object of research, nor the type of organization that employs him, provides a valid basis for the distinction between pure and applied science. The only real difference between the two, *at this moment in this society*, is that pure science is primarily subject to a system of peer-selection and applied science to a system of market selection. As Bourdieu & Passeron (1970) argue, by presenting their science as pure, objective, not influenced by commercial self-interest, academic scientists lay claim on a legitimate autonomy in which the system of peer-selection can flourish and their social system is perpetuated.

4. The Artistic Paradigm

Art does not exist in a transcendental realm of absolute aesthetics. It cannot be discussed at all without reference to a particular set of consumer preferences which is very much culture-dependent. An Italian art consumer of the high renaissance looked, among other things, for perspectival virtuosity in paintings, just as a Yoruba art consumers look for "clear lines" in carvings (Geertz, 1983, p. 98).

In respect to this fact, it seems to make sense to speak about art as we speak about other products, in terms of paradigms that consist of observable consumer preferences, trajectories that describe the movement of a particular paradigm in time, and networks of producers that take up competitive positions in the product space defined by the paradigm. The work of Martindale (1990) provides highly interesting examples of regularities in stylistic trajectories, at least with respect to a very small number of dimensions.

Just as in industries and scientific disciplines, life cycles can be observed in art. Radical experiments form the start of a particular style or movement. If successful, a rapid expansion of the community will take place. Maturity will also mean the rise of mobility barriers within the artistic community surrounding the many strategic groups, the slowing down of the rate of radical innovation and the shift to "cosmetic" product differentiation. The old art-historical workhorse of the development,

in each major style, from early-classical to late-baroque, tells of course the same story in more beautiful words.

However, art is a notoriously heterogenous and ill-defined concept. Where lies the boundary between art and craft? Can art include objects, which in the culture they originate from have a religious or purely utilitarian function? What about popular or low culture?

I would like to follow here Crane (1987) who puts aside the distinction between high and low culture and concentrates on the difference between avant-garde art and all other art. The members of the avant-garde, in her definition, participate in specific stylistic networks, "They must have some degree of awareness of one another as a social group."(p. 15). Most artists, though, are not in these groups and "are primarily concerned with the production of works that will sell rather than with the solution of aesthetic problems or the discovery of new techniques or subject matter." (p. 20). I want to propose to reserve the term "the cultural industries" to those non avant-garde artists and the enterprises in which they are employed or who transmit their work.

It is not far-fetched to note the similarities between, on the one hand, avant-garde art and science, and, on the other, the cultural industries and all other industries. Crow (1983) already suggested that the avant-garde functions as a research department of the cultural industries. The relation between avant-garde art and the cultural industries seems similar to the relation between pure and applied science, as discussed above.

However, the differences between avant-garde art and pure science are still large. I want to argue that the essential differences have to do with the nature of the selection system.

The major dichotomy is between what is and what is not subject to market selection. The cultural industries are, just as most other industries. Science is dominated by peer-selection. Avant-garde art, *at this moment*, is dominated by expert selection. The experts function as 'certifiers' (Mossetto, 1993), determining at the same time whether an object is a work of (avant-garde) art and its quality. The experts have the right to consecrate, in Bourdieu's terms. Avant-garde art typically aspires to the condition of being in a museum. More than anything else, its price reflects the probability that it will end up in a museum collection. Curators are the ultimate experts. Critics and the managers of galleries function as the "advance scouts of museum culture" (Fisher, 1991). To quote Crane again "The factor that sets the avant-garde art market apart from other markets is the extreme ambiguity concerning the value of the objects that are sold... value is attributed entirely on the basis of evaluations of quality by experts, including critics, museum curators, and, to some extent, eminent collectors." (p. 112).

There is, of course, a market for avant-garde art but this market is dominated by the expert gate-keepers. The most successful artists in the "open" market are associated with leading galleries and/or championed by leading critics and curators. This is most readily evident in the case of corporate collections that are almost

always put together by (a commission of) experts (Martorella, 1990). The judgment of the experts thus defines the paradigm and the success of individual producers is again determined by their position in product space and population density.

The dominance of expert selection has even increased in recent decades. The worlds of avant-garde artists and of experts interact less than before, partly because of the enormous expansion of both worlds, lessening the impact of peer-selection. American museums have become noticeably less receptive to new stylistic developments (Crane, p. 119). Also, the importance of expert-controlled museums and corporate collections, relative to private collections, has increased. Many people are worried about the increasing dominance by experts. Frey & Pommerehne (1989), for instance, suggest controlling their influence by organizing referenda among the general populations on expensive acquisitions and by limiting the length of the period a individual expert may serve on a board or commission.

However, even if practical, this would only slightly change the general system of selection. Much more crucial are the appropriability conditions. They determine not only the defensibility of individual successful positions in product space but also the nature of the selection system in which the network operates. To a large extent, the appropriability conditions are the rules which allow the network to perpetuate its own existence as a social system.

5. Appropriability

The innovating enterprise typically appropriates profits by having a patent on the underlying invention. Thereby, competitors are not only prevented from exactly copying the innovative object but they are not allowed to copy that which brings about the desired effect, the idea incorporated in the patented invention. Of course, the scope of patent protection is a matter of both academic and judicial controversy and the effective benefits of patenting are highly variable across industries (Levin *et al.*, 1987). Nevertheless, it is the principal instrument with which the public authorities modify the selection process of technological competition.

If a scientist has a new idea, she can choose between two basically different sets of options. On the one hand, she can apply for a patent and sell the patent to an enterprise or she can let the enterprise she works for apply for the patent, or she may start a new enterprise herself; on the other hand, she can publish an article or present a paper describing her idea.

If she chooses the first option she enters the system of market selection, her rewards are ultimately dependent on the success of the incorporation of her idea in the product space of an industry. If she publishes, her idea cannot be protected anymore by patenting. Copyright is rather unimportant among scientists. Most often it is claimed by the publishers. Appropriability is realized within the context of the peer-selection system. If you use an idea of someone else, you have to quote her or refer to her explicitly. If you do not do this, referees will advise against accepting your paper and editors will refuse it. If referees or editors fail to do so,

the wronged originator of the idea or her partisans will publicly attack you, thereby diminishing your credit in the scientific community.

Appropriability conditions in avant-garde art are, at the moment, completely different. The only legal protection an art work has is that of copyright, preventing copying in a narrow sense. The artist can sell the right to make reproductions or use her art work as the basis of commercial designs but very few avant-garde artists, at least in the visual arts, can make a living by these means. An artist who "invents" a new stylistic development has even fewer possibilities of appropriating it. The artist can not sell the stylistic development to an enterprise in the cultural industries and neither can she expect to be referred to in art-works of other artists who use her stylistic ideas. The only thing she can hope for is that the experts will establish that she was the originator of the style and that she therefore deserves a place in important collections and museums. The artist needs the experts not only to make him successful in the short run, she also needs them to defend her competitive position for her, to provide her with a measure of appropriability. One of the effects of this is to make it more risky for an artist who is recognized by the experts to change her style radically. If the experts cannot see how her early work relates to her later work, the chance that her new work will be appreciated will be low and she stands in risk of completely losing the appropriability connected with her name. "... dealers especially will complain, 'here you're doing this, there you're doing that. We don't know who you are.'." (Freeman, 1993, p. 202).

It is most important to realize that this is an effect of today's legal and institutional arrangements, not of an intrinsic characteristic of art. Today's laws of intellectual property reserve patent protection to ideas that have a demonstrable technological effect. Psychological effects are, of course, harder to measure, but there is no a priori reason not to have a patent-like system for art, making possible the appropriation of a stylistic innovation having a specific effect on the minds of observers. In that case, artists would be able to sell their ideas to the cultural industries or enterprises in these industries would then really employ avant-garde artists in R & D departments. The life cycles of avant-garde communities and cultural industries would then be coupled in the same way as the life cycles of scientific communities and industries, as described in section three. The problems connected with today's patent law would certainly plague stylistic patents even more, given that both scope and priority are even harder to determine in this case. It is emphatically not the aim of this paper to defend a patent-like system for the arts, just to make clear how much the selection system is dependent on the specific appropriability conditions.

In the same spirit, one could speculate that if society esteemed art highly enough as a method of extending human understanding to create as many university positions for artists as there are now for scientists, and if appointments to these positions were usually made by other artists on the basis of the originality and importance of previous work, artists would very likely develop a system of explicitly quoting each other. If both institutional and legal changes described above were to take place, artists would find themselves in exactly the same positions as scientists

now, *without necessarily changing the characteristics of art products*. They would be part of an artistic community in which peer-selection dominates, unless they perceived market opportunities for their ideas and decided to contribute to the market-selection driven technological paradigms of the cultural industries.

In fact, one can recognize in the history of art several, mostly unsuccessful, attempts to shift the boundaries between art, science and technology. One example can be found in the (early) academies in post-renaissance Italy and France which clearly were aimed at elevating the social status of artists by imitating the style of discourse of scientists, emphasizing the value of peer-judgment along and above the judgment of the market and of experts (Boschloo *et al.*, 1989). When the 'independents' revolted against the Salon and the Academy with the slogan "ni juge, ni recompense", the major source of their discontent was that in their eyes academical peer-selection had become transformed into a particularly conservative form of expert-selection. A different example may be provided by the Bauhaus movement which aimed to (re-)integrate art and technology, for instance by introducing 'design' in the artistic curriculum. The abstract expressionists, in contrast, were in general indignant at the suggestion that their art could be considered as 'design' (Clark, 1991), as commodities made to beautify living space. Because there was no effective institutional structure available to them for a system of peer-selection to develop, they were driven willy-nilly into the arms of the most powerful generation of experts the world had seen yet.

6. Conclusions

In this paper a conceptual framework has been proposed that is equally applicable to industry, science, and art. In each particular network of enterprises, scientists, or artists a process of competition takes place. For each network a paradigm can be described and the positions of the productions of every actor in a network can be determined in the product space defined by the paradigm. Each network is subject to a selection system and there are three idealtypical selection systems: market selection, peer selection, and expert selection. By proposing a homogenous way of describing networks, the effect the different selection systems have on the competitive process within the network could be shown clearly.

The development of a network can interact with the development of a network of a different category. This has been described in the case of scientific disciplines and industries. However, the interaction between the networks of avant-garde art and networks of other categories is comparatively low. This is in large part caused by the limited possibilities artists have with respect to appropriation in the current legal and institutional context. Avant-garde art may be described as the R & D of the cultural industries but few avant-garde artists are actually employed in the R & D departments of these industries. Postmodern theorists may state that art and science are the same thing, but few avant-garde artists are offered chairs at universities.

The isolation of avant-garde art from the rest of society, as is regularly bewailed by artists and by the spokespersons of society, can thus be seen to be an effect of selection systems and appropriability, not of an inherent incapacity of the modern artist to produce works that are considered important by society at large or of an inherent incapacity of the rest of society to understand what the artists are doing.

The framework also lends itself well to evolutionary and game-theoretical modelling of the micro-dynamics within the network. As stated in the introduction, one of the main reasons cultural economists need to know how art is different has to do with the possibilities of applying existing economic models and theories to art. It has been attempted in this paper to show that, on the one hand, art is an activity to which economic models and theories could and should be applied, and, on the other hand, economic models and theories should take the effects of different selection systems explicitly into account. Further research along these lines could lead to the creation of more sophisticated economic models and also to the application of quantitative methods where they have been applied very rarely, for instance in the study of the development of art styles.

Individual success within a particular network depends on the capability to occupy a profitable position in product space and the capability to defend the "territory" against competitors, the appropriability conditions.

However, appropriability conditions are not only of interest to study competition within a particular network, they also determine to a large degree the nature of the selection system. An individual competitor has a choice between three idealtypical courses of action. She can attempt to occupy an advantageous position within an existing network. If the most attractive positions in the existing network are not only occupied but also strongly defended, she can be a pioneer and attempt to bring into existence a new but similar network. Finally, she can attempt to cause the selection system dominating the existing network to change and hope that the resulting earthquakes will so change the competitive landscape that the old positions and their defences have become worthless. This century has seen a number of unsuccessful attempts by artists to change the selection system and to wrench the right to consecrate from the hands of the experts.

Maybe the most important practical conclusion of this paper is that such attempts are deemed to end in failure as long as the artists have no effective way to appropriate positions in product space without the help of the experts. If one considers this a problem, the framework of this paper allows one to make specific recommendations with respect to public policy towards art: not to worry too much about secondary problems such as how much to spend on this or that category of subsidies but to do something about appropriability conditions. A particularly interesting topic of further research would be to study exactly those cases in which the selection system was changed, either by actions of (groups of) individual competitors or by public policies. Firstly, to find out under which circumstances this can happen, and secondly, to look for macro-evolutionary patterns in the way more or less fre-

quent changes in selection systems determine the long-term viability of different categories of social systems.

Notes

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1. Of course, not all industries are exclusively subject to a system of market selection. For instance, in so-called "sheltered sectors", such as the defense industries, the system of expert selection dominates. However, I will restrict myself here, as in what follows, to the ideal-typical case.

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