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## **Publish or Stay Behind and Perhaps Perish: Stability of Publication Practices in (Some) Social Sciences**

*Zusammenfassung:* Obwohl neue technische Entwicklungen das schnelle und hinsichtlich der Länge problemlose Veröffentlichen ermöglichen, werden elektronische Medien in manchen Wissenschaften nur langsam – wenn überhaupt – akzeptiert und benutzt. Auf der Grundlage eines kulturhistorischen Ansatzes der dritten Generation argumentiere ich, dass sich die Stabilität von Veröffentlichungspraktiken (in Nordamerika) aus der Rolle der Publikationen in der akademischen Laufbahn ergibt. Entscheidungen in so unterschiedlichen Zusammenhängen wie Dauereinstellung, Beförderung, Gehalt, Gehaltserhöhung, und Drittmittelerwerb hängen von der Veröffentlichungsliste ab, die als eine Form der Objektivierung der Leistung eines Individuums verstanden wird. Die Stabilität der Veröffentlichungspraktiken kann man daher als das Produkt von der hoch vernetzten Natur akademischer Praktiken und Tätigkeitssystemen und der dialektischen Natur der Wissenschaftsgemeinden (communities of practice) verstehen, die sich sowohl identisch reproduzieren (Stasis), als auch in neuen Formen produzieren. Dieses Phänomen kann man zum Teil verstehen als das Bedürfnis eines Akademikers (einer Akademikerin), zur Erhaltung der Wissensgemeinde durch Dienste beizutragen, die den Entscheidungen über Dauereinstellung, Beförderung, und Gehalt Rechnung tragen.

### I. Introduction

A colleague working as science educator recently asked me about my tenure as one of the co-editors of *FQS: Forum Qualitative Sozialforschung/Forum Qualitative Social Research*, a refereed online journal for qualitative research methods. He asked me in particular about the number of hits per month we received to which I responded that in March 2004, for example, we have had 2,889,834 hits, 47,476 pdf file downloads, and 178,481 html file accesses and that our newsletter goes out to over 4,000 subscribers (Mey/Mruck 2004). My colleague then asked me what we had done to get these tremendously high numbers. In our subsequent conversation, he articulated the concern that his own discipline, science education, has seen only two electronic journals since the Internet has made new forms of publishing possible, and both journals (*Electronic Journal of Science Education* [<http://unr.edu/homepage/jcannon/ejse/>], *Electronic Journal of Literacy Through Science* [<http://sweeneyhall.sjsu.edu/ejls/>]) are struggling, with respect to readership, contributions, and recogni-

tion.<sup>1</sup> That is, although other journals in the field such as *Science Education* or the *Journal of Research in Science Teaching* continue to attract authors, despite, for example, their rejection rates of about 75 percent, other journals in the field, and in particular the electronic journals are not doing well. My colleague wanted to know whether I knew the reasons or had a hunch for this phenomenon, to which I responded with a hypothesis: The stability of publication practices can be understood to arise from the highly interconnected nature of practices (and activity systems) in the academy, and the dialectical nature of any communities of practice, which reproduces itself in (nearly) identical ways (stasis) as much as it produces itself in new forms. In this contribution, I articulate a theoretical framework based on networks of activity systems to discuss concrete circumstances in which the stability of publication practices is continuously produced and reproduced. That is, I do not take stability for granted but consider it as an *achievement* of networks of interacting activity systems. Taking such a stance forces the analyst to articulate the processes that continuously operate to stabilize the publication practices of a field, here, those that lead to the virtual rejection of new forms of publication opportunities in fields such as science education.

## II. Agency|Structure Dialectic

Many if not most social and psychological theories are deterministic and therefore stand little chance to explain the variability of human (social) actions. For example, socioeconomic factors are often cited as a cause of family violence (e.g., Martin/Tsui/Maitra/Marinshaw 1999) or as substantial and independent determinants of low school achievement (e.g., Payne/Biddle 1999). Such theories, however valuable to policy makers they may be, fail to account for all those concrete cases in which people living in poverty do not enact violence toward spouses, and where children living in poverty do in fact show high achievement. Similarly, school achievement is frequently explained in terms of causation: more intelligent individuals do better than less intelligent ones. However, I am not aware of nor could I find studies that correlate measures of intelligence and other variables with scholarly productivity. Even if such studies existed, they would not be able to explain every case of more or less productive university faculty. In my research, generative theories based on an agency|structure dialectic, and one of its particular realizations, third-generation activity theory have allowed me to understand and explain a wide variety of social and psychological phenomena without putting individual actors

1 As of April 30, 2004, the latter journal is listed in the Directory of Open Access Journals (<http://www.doaj.org/>), but not the former.

into deterministic straightjackets of social or psychological factors (e.g., Roth 2003). In the following, I sketch these two aspects of my approach drawing on examples pertinent to this special issue, that is, patterns of publication in the social sciences.

Generative theories in cultural sociology and social psychology are grounded in an agency|structure dialectic (e.g., Sewell 1992). Structure has two aspects that bear on social action. On the one hand, there are the objectively experienced sociomaterial<sup>2</sup> structures that are resources on which human beings draw in their concrete actions – authors use »the literature« or a »word processor« as material resources for composing a research article and may interact with journal editors in particular ways, »because« of the latter's positions in the scientific community. On the other hand, schemas are embodied (»mental«) structures that allow social actors to perceive and act toward material structures – authors at different points in their careers and with different levels of experience view the same literature, materially embodied in journals and books, in different ways. In a generative model of human social action, the two forms of structure (resources, schemas) stand in a dialectic relation rather than constituting a perfect homology, for the later leads to a deterministic model in which no change and (individual and cultural) development is possible.<sup>3</sup> From both cultural-historical and ontogenetic perspectives, sociomaterial resources (in the way they are perceived) and schemas (structures that generate perception and outward action) emerge together as human beings act(ed) in the world (Roth 2003). Thus new aspects of sociomaterial practices, resources, and schemas are always produced at the same time that other aspects are reproduced – even in the most mundane job at the assembly line, patterned actions (i.e., social practices) change both at the individual and collective levels in the course of praxis.

To articulate and theorize the structural aspects of human activities, some theorists (e.g., Engeström 1999) use a heuristic (Figure 1) that highlights the

- 2 I use the notion of »sociomaterial« structure, because, with Durkheim (1895, 45), I hold that the concreteness of social facts – always encountered in their concrete material detail of human interaction—is sociology's fundamental phenomenon; at the same time, the way in which material structures are apparent to the individual social agent is the result of social mediation (e.g., Mikhailov 1980). The social and material mutually presuppose one another, captured in the binding of the two adjectives into one.
- 3 Bourdieu frequently has been critiqued for the duality of his habitus-field pair of structures, which leads to the exact reproduction of existing structures, so that a system and its social actors is captured in stasis. Such criticisms cite passages such as, »As an acquired system of generative schemes objectively adjusted to the particular conditions in which it is constituted, the habitus engenders all the thoughts, all the perceptions, and all the actions consistent with those conditions and no others« (Bourdieu 1977, 95). Bourdieu, however, repeatedly rejected deterministic interpretations of his model and emphasized instead the generative nature of his model: »The notion of habitus accounts for the fact that social agents are neither particles of matter determined by external causes, nor little monads guided solely by internal reasons, executing a sort of perfectly rational internal program of action« (Bourdieu/Wacquant 1992, 136).

mediational role of production means, rules, community, and division of labor that operate within activity, the irreducible analytic unit of analysis. This heuristic was developed presupposing an agency|structure dialectic though articulated in terms of a subject|object dialectic. I explain the difference drawing on an example. *Researching* is a pervasive and archetypical activity in academe: Its results, published papers, are so crucial to academic careers that all new scholars are told by their elder peers, »publish or perish.« After identifying the nature of the activity to be researched, in my case *researching and publishing*, social scientists proceed to identify possible structures – the most obvious ones being the human subject and its object of activity, two mutually presupposing (dialectic) entities. What the object of activity is can be established only with respect to the subject of activity, and the nature of the subject can only be established with respect to the object of activity. It is not surprising, therefore, that the object has been conceived of as appearing twice, as both material entity and (the subject's) vision (Leont'ev 1978), a formulation that reproduces the dialectic nature of structure. For the same reason, though hardly ever articulated, the subject appears twice, as material body (»flesh«) and person (Roth in press).

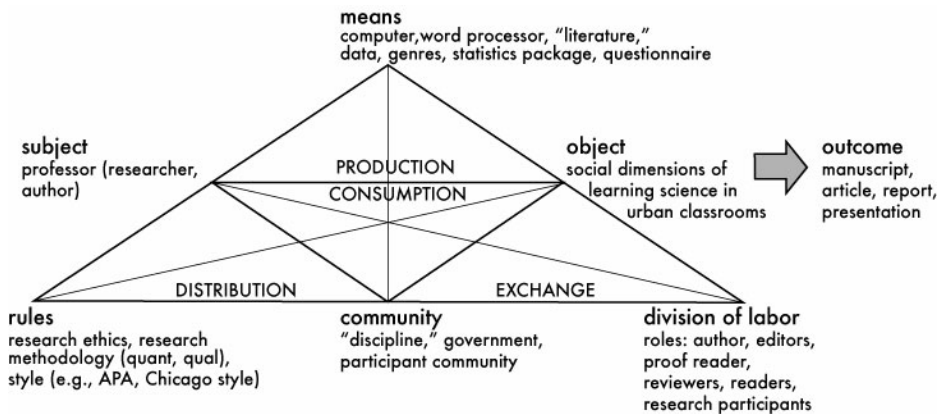


Figure 1. Heuristic for finding structure in human activities – treated as irreducible units of analysis – using researching in social science as an example.

The *community* defines the nature of the *object* (sometimes also motive«) in activity and is itself defined by the object: object and community arise together in the course of history and as a consequence of a *division of labor*. Thus, theoretician and researcher communities in education (Roth 2002a) or architecture (Turnbull 1993) emerged only after the relevant professional (practitioner)

communities of practice had established and as the result of a split from these communities of practice. In the same way that the *tools* available to researchers mediate the shape observed activities take (a researcher who knows only ANOVA will unlikely conduct an ethnographic study), *rules* mediate the processes and products of research and writing (research methodology describes, for example, the level of involvement between researcher and researched).<sup>4</sup> Most important to a dialectical activity theory is its cultural historical dimension, which is not captured in the static heuristic of Figure 1. Activities continuously unfold, entraining changes in their constitutive elements, so that neither activity systems as wholes nor their constitutive aspects can be understood outside the cultural-historical context in which they take place and which they shape in return. Recent articulations of the theory therefore refer to this approach as cultural-historical activity theory (CHAT). In doing research in the ways that other members recognize and accept it, the individual subject not only reproduces practices and the community they constitute, but also produces and reproduces itself as an, in its concrete practices recognizable member of this community. The individual subject and its collective culture, expressed in but not entirely represented by the community, stand in a dialectical relationship. The individual always concretely realizes possible actions that exist at the collective level, and in concretely realizing culture both reproduce it and produce new variants of it, which leads to the development of cultural possibilities.

Although activities constitute the unit of analysis, there are two further levels of events that need to be distinguished, or, in other words, lead to structure: actions, which are directed toward goals formulated by individual subjects and operations, which are unconscious and occur in response to current conditions. Thus, whereas *researching* has a collective motive, *writing an introductory paragraph* for an article about the stability of publication practices were clearly enacted and pursued goals articulated by this author. Activities and the concrete actions that constitute them presuppose one another: activities are concretely realized by embodied actions in the pursuit of specific goals, but these goals and actions are brought forth only for realizing a specific activity. The sense of individual actions arises from their relations to specific activities: *asking* a question has a different sense when it is done to realize a research project than when it realizes a contribution to the nightly news. Actions themselves are constituted by unconscious operations: in the process of writing an introductory paragraph for this research article, specific words arise in response to the current state of a sentence but I do not control the emergence of the words

4 I do not conceive of rules as determinants of action, but as resources to situated action. What the relationship of established rules and situated actions is an empirical matter that can be established only a posteriori (Suchman 1987).

themselves. My fingers on the keyboard produce these sentences, but I do not consciously control their movement – apparent in my consciousness are shape and content of the sentences that appear on the screen. Actions and the operations that constitute them also presuppose one another: properly sequenced operations concretely realize an action, but the current state of the action conditions their emergence – I write sentences before having composed them in my head, but the words that appear on the screen are not arbitrary and stand in more or less ordered relationships to what is already there. Because actions draw on embodied operations, which take considerable time periods to become established, (cognitive) practices are durable simply because of the investments involved in changing them.

### III. Third-Generation Cultural Historical Activity Theory

Generative agency|structure dialectic and cultural historical activity theory are not yet sufficient to explain phenomena at the collective (societal) level: activity systems do not exist in a vacuum, as they were treated in second-generation activity theory.<sup>5</sup> They interact with, and are constitutive elements of, networks of activity systems. For example, the activity system as concretely realized by the professor in Figure 1 receives rules and instruments from other activity systems (e.g., American Psychological Association, tests, computers, software), and produces outcomes for certain other activity systems (e.g., research participants, such as school districts) (see Figure 2). Thus, people and artifacts (instruments, tools, reports) move from activity systems into other activity system. This flow constitutes a heterogeneous network of otherwise often independently functioning activity systems – professors doing their research and publish are seldom conscious of the activities in the offices of the American Psychological Association. The stability of networks of activity results from this flow as well as from the durability of concrete people and material things (Latour 1987), because they are now constitutive elements not merely of one but in fact of multiple activity systems.

The movements of people and things from one activity system into another are not a sufficient explanation for surprising events and changes in the activity of interest. The foreign entities are first appropriated by the activity system, are modified, and made integral and in-dissociable part of it. At the same time, this introduction can give rise to tensions, antinomies, contradictions, and

5 First-generation activity theory (e.g., Vygotsky 1978) focused almost exclusively on the tool-mediated nature of activity, but did not theorize the dialectical relation that co-constitutes individual and collective; second-generation activity theory focused on how a collectivity mediates the object of activity, but did not concern itself with the interrelation of multiple activity systems.

breakdowns: identifying, dealing with, and working through these, the activity inhibiting situations leads to change. If we were interested in changing an activity system, we would attempt to locate the contradictions, antinomies, breakdowns, or tensions and, in a collective fashion involving other members of the system, remove the problematic aspects. Because human subjects are constitutive part of their activities, they have the power to produce change all the while reproducing other aspects of the system.

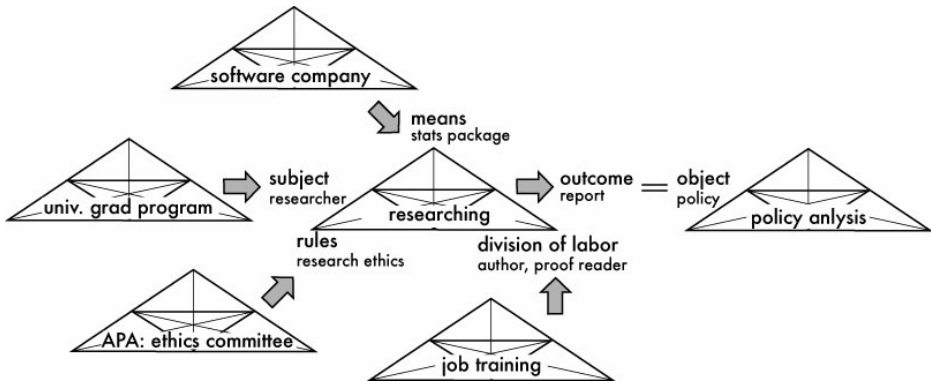


Figure 2. Social phenomena are best explained in terms of the interaction of multiple activity systems, which occurs by means of a flow of people and things. The stability of the resulting networks is proportional to the investments and consequences to the entire network when the flow is stopped.

Using cultural-historical activity theory in its third-generation form allows us to demystify processes hidden from many researchers, and articulate the concrete actions that bring about the outcomes that the researchers actually come to see, for instance, the decision letter from the editor to the author. In my experience, many young scholars who receive rejection letters see these as objective reflections of their work rather than as the results of processes in which real people are involved, those with whom they interact, for example, at conferences, and whose work they judge as reviewers. The third-generation CHAT approach no longer articulates activities one at a time, but as simultaneous and interdependent activities that form a network. Second, third-generation CHAT encourages us to study the *processes* (always accomplished in *concrete* human actions) that bring about, for example, the entire review of a submitted manuscript leading the production of a rejection or acceptance letter. In the following, I use third-generation cultural-historical activity theory to articulate some aspects of scholarly activity that contributes to the stability of publication practices in the social sciences, supported with evidence from the discipline of science education.

#### IV. Publish or Perish

»Why,« to return to my colleague's question, »do new (electronic) journals have such a hard time to establish themselves [in some disciplines]?« The diction »publish or perish« encourages us to study two potential sites that contribute to the stability of publication practices: (a) the research-writing-submission-publication axis of a faculty member's work, the results of which are inscribed in and represented by the cumulative curriculum vitae (CVs); and (b) the – in North American universities pervasive – evaluation of the faculty member by salary, tenure and promotion committees or deans of faculty based on submitted CVs (Figure 3). At least in the Canadian situation, the research record as inscribed in a CV is also an important element in the evaluation of research grant applications to the major research funding source, the *Social Sciences and Humanities Research Council of Canada*, where, for a regular scholar, 60 percent of a proposal evaluation pertains to the CV and 40 percent to the project itself. The publication record as embodied in a CV therefore constitutes an important resource in garnering funding for future research. Investments in the resulting history and network of activities – existing in the form of people, materials, and

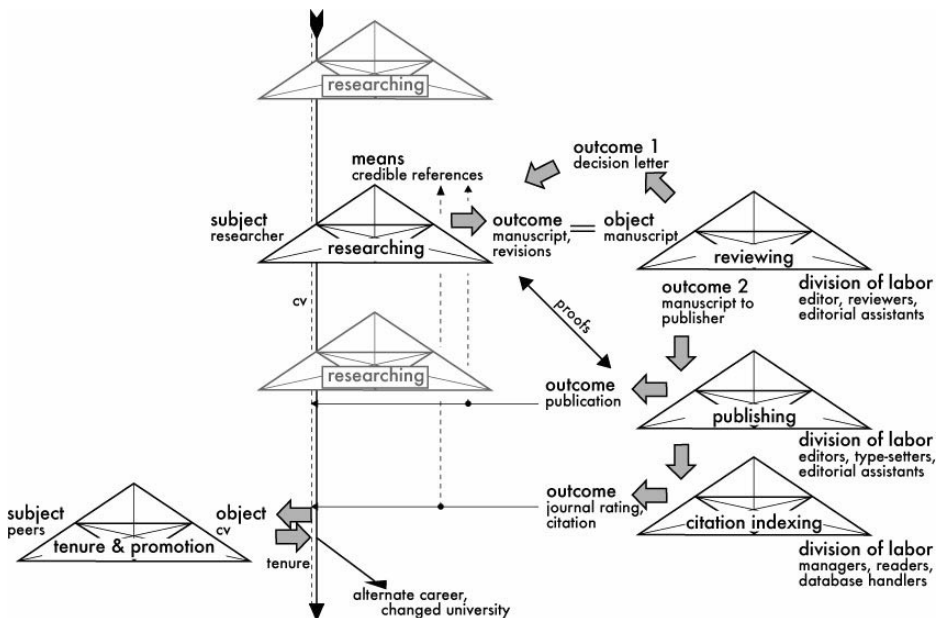


Figure 3. A temporal look at an untenured faculty member's recurrent research activities, which, ideally, result in relevant publications that are subsequently represented as entries in the researcher's curriculum vitae (CV). During tenure and promotion decisions, the CV stands in for (represents) the researcher.



practices – contribute to stabilizing particular genres and journals and make it difficult for change to occur. Because of the linkage between researching-publishing, on the one hand, and career progress (survive or perish), on the other, the motive (object) for engaging in research may actually be the building of a CV to jump the tenure and promotion hurdle rather than the generation of new knowledge.

#### IV.1 On the Perils of Not-Publishing

As a general rule across North America and across disciplines, »one or two articles published in highly prestigious journals might win the author tenure or a healthy pay raise, more articles published in less prestigious journals might be needed to secure the same rewards« (Korobkin 1999, 858). »Producing enough« to make the tenure hurdle is the principal motive for much research in North American universities, and is associated with considerable anxiety on the part of new scholars. That is, the evaluation of productivity is not *pro forma*, a done deal, but a serious activity with consequences for the individual involved – requests for tenure, promotion, salary increases, or research funding *are* rejected rather than automatically granted. Over the past dozen years, I frequently participated on committees that evaluated faculty members using their curriculum vitae as the main source of evidence. These committees make decisions about tenure, promotion, salary increases, or awards. Each of these situations can be considered as a concrete realization of a form of activity, with the committee as the (collective) *subject*, the particular CVs as the *object* (motive), and the production of a (written) evaluation as the *outcome* (Figures 1, 3). In all of these committees, the value of contributions a researcher has made to the scholarly literature and community is, to a great extent, established in terms of the number, length, and quality of articles published.<sup>6</sup> Whereas the number and length of articles – very short ones, editorials, or comments and criticisms count less than regular »full-length« articles – can easily be established by inspecting the CV, the quality of journals is less readily established, the outcomes depending on the committee composition. Here, committees draw on a variety of *means* to assist them, including journal rankings, impact, usefulness, and qualitative »tiers,« in the production of an evaluation and decision, which is formalized in a letter that goes back to the applicant.<sup>7</sup> Cultural-historical activity theory allows us to articulate the various elements that enter the decision-making process, and therefore they are integral to the outcomes. The evaluation articulated in the letter to the candidate

6 Elsewhere I provided a detailed analysis and modeling of the inner workings of committees in funding agencies, and the vagaries that these may lead to (Roth 2002c).

7 This letter is another material entity that constitutes or contributes to constituting the flowing matter that makes and stabilizes networks of different activity systems (Roth 2002b).

and dean is as much a reflection of the committee process as it is a reflection of the candidates and their CVs.

In all of the committee meetings I attended, publications that appear in »flagship journals« have been rated considerably higher and counted positively in the evaluation, whereas »second [third] tier journals« not only may count less but also, in some cases, may count against the person. Thus, to a North American researcher in science education the *Journal of Research in Science Teaching* and *Science Education* constitute first tier journals, whereas the *International Journal of Science Education* and *Research in Science Education* might constitute tier two journals, and so forth. To establish the quality of the journals, that is, to attribute them to »first tier,« »second tier,« or »third tier,« committee members may draw on and articulate different forms of evidence. For example, many members and external evaluators draw on their own sense and experience to establish the impact a journal has on the field. Such evidence is very personal, and some individuals, as I could ascertain on two committees in the months prior to writing this article, may therefore value journals with a regional or national orientation as highly as those journals – unknown to them – that truly have an international orientation and readership. Other members, on the other hand, may use »objective measures« such as rejection rates (obtained from editors), journal impact (as provided by *Journal Citation Reports*<sup>®</sup>), journal rankings (as a result of ranking using impact ratings), or relative journal rank within discipline<sup>8</sup> as indicators. Judgments based on influence, significance, or importance of research publications could be used, but they require qualitative analysis by experts in the field, a process often too time-consuming and expense to be feasible (Garfield/Welljams-Doroof 1992). Tracking how often papers are cited, citation databases constitute tools for indicating impact of primary research papers and, after aggregation, can indicate the relative impact of individuals and journals as well as larger units such as departments, disciplines, fields, and the science as a whole.

Committees consider the extent to which the applicants contributed to the community of which they are constitutive members. Service as reviewer, member of editorial board, associate editor, or editor are considered to be legitimate contributions to the field, increasing in value in the order listed here. Researchers seeking tenure or new jobs therefore ought to participate in the discipline by serving as a reviewer and, during later stages of their career, as members of editorial boards, associate editors or editors. The value of the

8 Relative journal ranking in the discipline  $r$  can be calculated according to the equation  $r = 1 - (n - 1)/N$ , where  $n$  is the descending rank number and  $N$  the total number of journals in the discipline (Popescu/Ganciu/Penache/Penache 1998). That is, the *Journal of Research in Science Teaching* (JRST) was ranked 8th of 102 journals, it would have a value of  $r = 1 - (8 - 1)/102 = 0.93$ , which means that 93 percent of journals in the field have a rank and corresponding impact factor lower than JRST.

service, as considered by the committee, again depends on the journal with which the person associates itself, which can, in disciplines such as law, be critical to obtaining coveted jobs in one of the major law faculties (Korobkin 1999). It may therefore come as little surprise that a substantial number of the editorial board members of the *Journal of Research in Science Teaching* are untenured assistant professors and recently appointed associate professors. To review and even more so to be a member of an editorial board, one needs to have published in the journal.

Funding records also contribute *as means* to committee engaged in the evaluation of scholars, and deans of faculty impress upon new members the importance of getting grants to their careers. However, getting grants heavily depends, at least in Canada, on publication records. In the *Social Sciences and Humanities Research Council of Canada*, the proposals of new scholars (first 5 years) are judged according to a 40:60 or 60:40 percent split for record and quality of project (whichever gives a higher score), whereas regular scholars are judged according to the mentioned 60:40 record-project weighting. Thus, although it is desirable to be able to list research grants, getting them is itself a function of prior research publications as represented in CVs. A frequent advice to new scholars therefore consists in statements such as »Getting on the funding train early or missing it for the entirety of a career.« Furthermore, national impact is valued higher than a regional one, and international impact higher than national, each distinction defining a ten-percent cluster. This, in turn, favors publications in international and high-impact journals, which receive higher evaluations than national or regional journals and higher evaluations than journals that are not ranked at all.

As a result of their activities related to researching, publishing, doing service to journals, and getting grants, faculty members increase the numbers and weightiness of lines in their CVs.<sup>9</sup> The CVs not only are representations of researchers' accomplishments, but also becomes their representatives (spokesperson) that are interrogated by and provide answers to the respective committees.<sup>10</sup> In decisions that affect the careers of researchers, members of the relevant committees draw on a variety of data, all of which are the outcomes of activity systems directly or indirectly linked to *doing* research (Figure 3). Researching contributes to publishing, which itself contributes to being cited,

<sup>9</sup> An Australian colleague takes an entirely pragmatic perspective on research activity, counting all returns in terms of their value to the CV. Thus, he greets every publication with the comment, »Another line on my CV.« Everything he does seems to be connected to adding lines to his CV, and I only hear from him when another line is at stake. As the editor of a journal, he even regards »weaker« articles as counting against not only the journal but against him and his record.

<sup>10</sup> This articulation of a representation as a spokesperson for the person it represents is consistent with an actor network approach, which treats human and non-human actors symmetrically (Roth/McGinn 1998).

serving in different functions in journal operations, and getting grants. That is, publication records weigh heavily in direct and indirect ways on scholarly careers. To make it through the various decision processes where they have to submit their CVs to represent themselves, faculty members at all stages of their career orient towards (are motivated by) the various elements that enter the considerations. That is, the motives concretely realized in the researching and publishing activities (Figures 1-3) are mediated by the means that enter decision making in other activity systems, which, in turn, draw on objects, people, outcomes of networks of activities that have formed around publishing.

In this mix of activities publishing and participating in maintaining new journals is therefore a risky business for new faculty members, who, in science education for example, do much of the publishing, reviewing, and editorial board service. Publishing in one of the new electronic journals or doing service to maintain it alive may not only count little but even count against the faculty member.

#### IV.2 On Citing and Being Cited

Authors and the journals in which they (aspire to) publish are part of self-reproducing and self-stabilizing networks of activity systems. Journals exist in a network of activities that involve materials, people, and practices that contribute to stabilizing the networks (Figure 3): as soon as the relation between one activity system and another is held for an amount of time, it generates effects of stability within and across systems as well as the conditions of power (Law 1991). The flow of objects between systems links different activities (authoring, editing, reviewing, and publishing) and thereby contributes to the performance of relationships, such as editor-author (acknowledgment of receipt, decision letter, letter of acceptance), reviewer-author (review), editor-reviewer (request to review, manuscript, review), editor-publisher (manuscripts), publisher-author (proofs), and so forth. People are involved in all of these relations, not only those already listed, but also support personnel within the different activity systems including secretaries (making copies), editorial assistants (managing manuscripts and databases), type-setters, managing editors, printers, and web administrators (for electronic publishing).

Peer review involves the creation and movement of many documents, only some of which the authors get to see. In addition to the manuscript, there may be reviewer rating forms, letters from the editor to the reviewers, reviews with comments to the editor and comments to the authors, editorial decision letters, electronic or paper databases for tracking documents, statistical information about manuscript flow, cover letters specifying changes in revisions, acceptance letters, marked up manuscripts, galley proofs, and reprints. All of

these documents constitute durable material objects; the flow of such durable objects stabilizes networks of activity systems by reproducing and therefore confirming and reifying existing relations (Roth 2002b).

This stability arises from the flow of these intermediaries, a current that continues even if some of the actors disappear from the network because they opt out or are removed (e.g., when tenure is denied). Manuscripts, reviews, decision letters, and CVs are intermediaries that function like any other intermediaries (currencies) that become the lifeblood of a system, seemingly indispensable; this fluid constitutes the social topology of a discipline. This fluid produces a level of stability that makes any change effort difficult. All of these events and processes contribute to the stability of form and content of publications even in the apparently most solitary form of scholarly pursuits, doing and writing philosophy (Cronin 2004).

Journals also face the potential of perishing; they have to contribute to staying in the field, which they do by contributing to the stability of the networks in which they are involved. Journals are not things that stand on their own but have their own context, that is, they are judged in the context of other journals in terms of comparison of readership, distribution, importance to the field, quality of the articles published, nature of the articles published, and so forth. There is a network within which journals operate and are caught up, one that is established by the ranking procedures of such institutions as the Social Sciences Citation Index. A criterion often invoked for tenure and promotion purposes is the impact of the author on the field. One measure of impact is the citation statistic, which to a large extent depends on the spread of the journal rather than the quality of the article. An article published in the *Educational Researcher*, which is automatically mailed to more than 10,000 members of the American Educational Research Association, has a higher spread and therefore likelihood to be cited than an article by the same author published in the *Journal of Research in Science Teaching*, also sent automatically to the roughly 1,500 members of the National Association for Research in Science Teaching (despite its name, an international organization). An article in *Review of Educational Research* with a large subscription base has a higher potential to be cited than if it was published in the *Journal of Research in Science Teaching* with a smaller distribution. At the same time, journals with a small number of citable articles and issues per year, such as *Review of Educational Research* (1998-2002,  $N_{av} = 14$ ) or *Journal of the Learning Sciences* (1998-2002,  $N_{av} = 11$ ), tend to be found among the highest ranked journals in the field. Given the way citation rankings are calculated, one or two well-published authors can significantly affect the citation index and therefore the rankings of these journals.

Citation studies are often undertaken to evaluate faculty members and institutions in addition to studying structure and development of a field or cited motivation (Rousseau/Zuccala 2004). Such studies show how different social

actors operating in the same or different activity systems generate resources that tend to produce and reproduce stability of publication practices. These social actors – that is, constituents of the subject|object dialectic in various activity systems – include authors, journals, institutes, countries, scientific journals, and combinations thereof as factors.

Authors contribute to the stability of publication activities by producing and reproducing citation networks and collective interests. To get their work accepted in the »flagship« journals, authors have to show that their research object is of collective interest – pursues a collective motive – that their research methods conforms with standard methodologies (rules), draw on the well-known papers and authors as resources (tools) to support their arguments, and that they use standard formats (genres) as means to communicate their ideas. They combine these with »original data,« to create research narratives that are, in some ways, reflective of the setting in which the protagonists (and authors) have lived. They draw on other actors such as previously published reports, common knowledge, and established scientific processes and experimental procedures to construct the reasonableness of their research question and experimental design. Common knowledge and widely accepted facts, concepts, and theories are more powerful supporters in an author's scheme than other yet-unconfirmed research findings; articles by »authorities« are more powerful allies than articles by largely unknown researchers. Leading authorities and »more important« articles are those published in flagship journals. Thus, my experience serving as associate editor or editorial board member shows that citing an author in a second- or third-tier journal (e.g., *School Science and Mathematics*) or an online publication (e.g., *Electronic Journal of Science Education*) is taken as weak support to the statement a science education author makes than if the citation is to a leading author and journal. The authors have to anticipate the possible ways in which editors and reviewers might read their manuscript, and they use these anticipations in shaping their manuscript. That is, a manuscript inherently becomes a cultural object not only because the language used »exists asymmetrically, always for *the other*, from the other, kept by the other. Coming from the other, remaining with the other, and returning to the other« (Derrida 1998, 40) but also because genre, citations, referencing, and other aspects of the text as a whole can be recognized by other members of the discipline as a concrete realization of discipline-specific cultural possibilities. In producing manuscripts that are recognized by others in this way, authors mainly reproduce cultural possibilities and shy away from producing new texts and possibilities.

Citing the work of others constructs links between authors and journals. Thus, each time authors cite articles that have been published in a leading journal, they also contribute to stabilizing the network of journals within which they exists and to reaffirming and reifying the status of the journal and the power of

the editor. Each citation – which is a material sign that points to and has been occasioned by an article, and therefore part of the material flow – contributes to the maintenance of the existing network. Each citation even contributes to the maintenance of journals to which authors do not submit their work (Roth 2002b). In the same way, each citation of an author's work by other authors contributes to the calculation of the citation index and impact rating. Again, they thereby contribute to stabilizing the journal and its editor – as citing author and as cited author.

Many authors – in part depending on the type of institution, college, teaching university, research university (»Research I«) or comprehensive university – attempt to publish in the »flagship journals« of their field, in fact, they have to publish in these journals if they want to make the tenure barrier. However, one might ask, »What constitutes a flagship journal, and why do others belong to the »second tier«, »third tier«, and so on?«<sup>11</sup>

Journals that are already ranked high, on subjective-qualitative or quantitative basis, receive more submissions and are more desirable outlets for scholarly activity than others that are ranked lower. In science education, the two »leading« journals *Journal of Research in Science Teaching* (JRST) and *Science Education* are also those that rank highest in the ISI citation index according to the journal impact factor – often making it among the top ten of the more than 100 education journals ranked.<sup>12</sup> Both journals reject 75 percent or more of submitted articles (for JRST, between 220 and 250), and therefore tend to feature articles of only a small fraction of authors in the worldwide community of science education. These rejected articles are frequently submitted with little change to the next journal on the list of rankings.<sup>13</sup> But now, there are many print journals to which an author in science education may submit. It may therefore come as little surprise that (a) the journals in the field publish the same kind of articles and (b) the third journal in the rankings, the *International Journal of Science Education*, has increased its numbers from six per year to 12,

11 In the field of law, for example, five tiers of authors and journals have been identified (Korobkin 1999).

12 The journal impact factor is a measure of the average citation frequency for a specific citable item (article, review, letter, discovery account, note, and abstract) in a specific journal during a specific year or period (Garfield 1979). Thus, the impact factor for a specific journal in 2004 is calculated (total citations in 2002 and 2003)/(total citable articles in 2002 and 2003). This means that journals with a limited number of articles may easily become those with the highest impact factor. The »leading« journal in education in terms of cumulative rankings over 10-year spans, *Review of Educational Research*, publishes less than 15 articles a year and has an impact factor of about 3. That is, a small number of authors may be responsible for pushing the journal to the top.

13 Having served on many journals concurrently, I have been asked repeatedly to review the same manuscript for different journals. Old-timers in science education provide newcomers with the advice of sending a manuscript first to the top journal, *Journal of Research in Science Teaching*, and then, if it is rejected, to »go down the list,« where it is implied that the list is rank-ordered from most-desirable (»best«) to least-desirable journal.

and most recently to 15. At the same time, the *Electronic Journal of Science Education* has had insufficient submissions and therefore not published a single issue between December 2002 and the time of this writing (its home page provides as reason, »EJSE is experiencing a major backlog in its publication schedule. Efforts are underway to bring the journal up to date.«); the *Electronic Journal of Literacy through Science* has not received a substantial number of manuscript and published only 8 articles over its two years of existence.

Citations are an important means of producing and reproducing scholarly communities and sub-communities networks, and they can be used to map the intellectual content of field and demarcate their (porous) boundaries (Hummon«Doreian 1989). But there is more to citations. Authors want to publish in flagship journals, but publishers want to maintain their advantage (sales, readership): they have to maintain their staff to be able to publish their palette of journals. Both are interested in keeping the journal rankings and perceived importance high. Publishers actively contribute to the role of citation indices and journal rankings by using them in their advertisements and in the construction of team spirit in editorial board meetings. Thus *SAGE Publications* feature the rankings of several journal on top of the journal home page; the *Wiley Publishers* representative begins the editorial board meeting of the *Journal of Research in Science Teaching* with the citation information from the past several years; and an editor of *Science Education* pointed out in an editorial board meeting out how far the journal has climbed in the ranking, a fact that he attributes to the editorial board and his own editorship (»I wanted to let you know that most recent Journal Citation Report showed that out of 101 journals published in educational research, *Science Education* ranks #10. Everyone affiliated with the journal should be proud of this accomplishment« [email July 3, 2001]). It is therefore of interest to companies to provide editors with support (e.g., paying for a [graduate] editorial assistant); and editors want to maintain the edge of their journal to warrant and perhaps increase the support they receive, which allows them to increase the number of issues that they publish per year. Thus, over the past 15 years, the three major journals in the science education discipline have increased the number of issues or pages published (Table 1). This support, »hard currency,« constitutes another material object that stabilizes the relationship between editors and publisher. By increasing space, science education journals have attracted authors and readers, but the manuscript rejection rates have stayed constant.

Journal rankings may mediate the nature of scholarship published, the stabilization of journal rankings. Thus, rankings can create incentives for journal editors to select certain types of manuscripts and the selection of certain types of manuscripts can create incentives for authors seeking publication in those journals to produce those types of manuscripts (Korobkin 1999). The practice of ranking journals constitutes a form of feedback by increasing perceived



importance. Thus, four of the five leading journals in clinical medicine increased their relative citation impact on the field (Garfield/Welljams-Doroof 1992), stabilizing these journals against the potential impact of other publication outlets.

Table 1. Number of issues and pages published in three science education journals in 1989 and 2003

Year Journal	1989		2003	
	Number of Issues	Number of Pages	Number of Issues	Number of Pages
Journal of Research in Science Teaching	9	784	10	1114
Science Education <sup>1</sup>	5	593	6	918
International Journal of Science Education <sup>2</sup>	3	362	12	1544

Note 1: There were 6 issues, but at the time one issue was entirely devoted to a summary of the literature. In 1989, there were 141 pages in the summary issue.

Note 2: Starting 2004, this journal publishes 15 issues/year

Journals tend to support particular formats, genres, and research methods. Perceived tendencies for formats, genres, and research methods become resources for authors to shape their own articles. If journal editors adjust their article selection criteria in an attempt to increase their relative prestige, authors will adjust the content, format, and genre of their articles because they wish to place their articles in the highly ranked journals. As the leading authors, editors, and editorial board members all have emerged from the same community of practice, the currently leading journals in science education differ very little from one another. This point is part of the argument for a new journal made in a recent proposal for a new and different journal in the field:

Of concern to the editors of the proposed journal is that those reviewers and journal editors who tend to reify methodologies grounded in positivism and conceptual change theory harshly treat articles seeking to break the mold, such as the ones we would be soliciting. Articles that do not conform to these methodological and epistemological underpinnings are frequently rejected in the other journals (Submission to Kluwer Academic Publishers).

This certainly contributes to the fact that most journal articles in the field are not only highly uniform but also that the journals differ very little in the content and format of the articles they publish, though they differ in terms of the quality standards that the field sets. Thus, the proposal suggested:

Although there are numerous journals in science education at the moment, most are almost identical in what they publish and encourage for submission. Leading journals such as *Journal of Research in Science Teaching*, *Science Education*, *International Journal of Science Education*, *Research in Science Education*, and *Journal of Science and Technological Education* are virtually indistinguishable. Editors, editorial boards and reviewers are selected to produce forms of scholarly activity that are primarily grounded in traditional psychology and inattentive to theories from cultural studies. There is a focus on production with each journal seeking more pages per year and a press on authors to write shorter articles (Submission to Kluwer Academic Publishers).

These common formats are resources of limited range to new authors, who come to produce manuscripts of a similar type and thereby reproduce the field as it is. An author can begin submitting a manuscript to the most highly ranked journal, and then, if necessary, move down the list without making any changes in the text, until a journal actually accepts it. In summary, then, the developments over the past two decades have seen an expansion of the traditionally dominant journals in science education and the few additions that use the traditional print format are reproducing the practices of the existing ones. On the other hand, despite the promises of open access and potential for wide distribution made possible by online journals (e.g., Mey/Mruck 2004), this new form of publishing has made extremely marginal inroads in science education.

### IV.3 Where are the Others?

Against the domination of the three major journals in the discipline, other print journals in science education find it difficult to exist, and the electronic journals tend to have very little appeal. Among the journals, only *Research in Science Education* has recently been entered in the ISI listing, after the Australasian Science Education Research Association sold it to Kluwer Academic Publishers. Other journals have a more limited appeal, are listed in fewer abstracting systems, and fail to attract manuscripts by the leading scholars in the field. Among these journals feature the *Journal of Science Teacher Education*, *International Journal of Science and Mathematics Education*, *Science & Education*, and *Journal of Science Education and Technology*, *Research in Science & Technological Education*, *School Science Review*, or *Studies in Science Education*. Though often aspiring and publishing international authors, other science education journals have even more marginal existence, including the *Journal of the Korean Science Education*, and journals published in a language other than English are virtually not cited at all, including *Didaskalia* (France), *Zeitschrift für Didaktik*

*der Naturwissenschaften* (Germany), or *Enseñanza de las Ciencias* (Spain). All of these journals constitute outlets for scholarly productivity, but, because they do not contribute to the citation network, do not significantly enhance (North American) authors' credibility within the field nor do citations in these journals add to journals and authors in the »flagship journals.« Currently, electronic journals are considered to be »even lower on the totem pole« (Larry Yore, personal communication, January 2004) in part because of perceptions that it is easier to get published, that the review processes are not as rigorous as in the leading journals, that it is not desirable to publish in the journals given that the leading scholars do not publish there and likely do not read these journals, and so forth. A number of leading scholars also suggest that there are »too many journals in the field.« That is, the »flagship journals« are part of a self-stabilizing network, which excludes others, an exclusion that is co-produced by the failure to contribute to the stabilization of citation networks – a reverse statement of the function cited-citing pairs in constituting and stabilizing scientific communities (Leydesdorff 1998). To make inroads, electronic publications need to link with established networks, such as being part of catalogues of abstracts and secondary distribution means such as EBSCO Publishing (Mey/Mruck 2004). Established scholars do not or little contribute to lower ranked journals; they also sit on tenure, promotion, salary, and funding committees using journal rankings and qualitative indicators as measures of productivity for their more junior colleagues. Senior scholars hold editor and associate editor positions, making decisions about what kind of articles to include or exclude – directly, by not entering an article in the review process, or indirectly, by sending it to reviewers that will certainly reject the piece.<sup>14</sup> They contribute to producing the stability of the network by reproducing the existing status quo, making it difficult to impossible for new formats (e-journals) and genres to establish themselves.

14 An example excerpt of such a letter states: »I have elected not to place this manuscript into the review process because after a careful reading I find that 1) it does not explicitly deal with issues of science education; 2) it does not extend our knowledge about teaching practices - e.g., your theory of practice does not report new and novel perspectives that inform preservice or inservice teacher education; and 3) it employs a format for the reporting of ethnographic research which does not make obvious to the reader how you move from the evidence to the results and conclusions reported« (Letter from the editor, MAR 01, 1996). As an example of the second case, the then editor of *Science Education* sent an article entitled »Towards an Anthropology of Graphing« to a cognitive psychologist, who stated that he did not understand anthropology, that there was too much anthropology in the article, and that it should be rejected.

## V. Conclusion

In this article, I articulated a framework for analyzing the apparent stability of publication practices, drawing in particular on example from one discipline, science education. The dialectical agency|structure framework allows us to understand and explain, why and how each author, even those who try but do not get published in flagship journals, contribute resources to the networks that tend to stabilize them. That is, with each failure to get a research manuscript through the review process, an author actively contributes to producing the collective interest in writing for these journals and to the rejection statistics, both of which tend to stabilize these journals. The third-generation activity theory contributes to understanding how the movement of material objects contributes to the production and reproduction of networks of activity systems, each of which requires exchanges with other systems to stabilize simultaneously the network and itself. Although the tenure, promotion, and salary decisions, which contribute to the stability of the flagship journals, do not exist in other countries, funding decisions are made on similar grounds, leading to the stabilization of research and publication practices in these countries as well. Although restricted in their influence on the literature in the lingua franca language English, publications and grant proposals tend to lead to characteristic stabilities by drawing on particular citation practices that produce and reproduce the status of journals, editors, and scholars.

Because of the interconnected nature of the activities and activity systems relative to publishing, service (journals), grantsmanship, and being successful in getting research published reaps additional rewards, which accumulate to make curriculum vitae that will stand scrutiny during subsequent evaluation processes. That is, success breeds success not in a linear but in an exponential fashion. Success, however, crucially depends on the journals in which a scholar's work gets published, which tends to stabilize existing rank orders, making it difficult for new journals to establish themselves. This stabilizes existing journals and journal hierarchies at the expense of new journals, even those that provide opportunities for changing the field. In the field of science education, however, there is an interesting development that future analyses might elucidate. Despite their international appeal, the *Journal of Research in Science Teaching* and *Science Education* tended to be more nationalist, because review processes disfavor non-English speaking authors, both because of linguistic problems with the pieces and with cultural differences in format and genre.<sup>15</sup> The *International Journal of Science Education*, on the other hand, seemed to have made a particular effort in attracting scholars from around the

<sup>15</sup> Reviewing more than 50 manuscripts per year, for 30 or more journals in several discipline, I have learned to identify the country or continent of origin of a manuscript based on type of research, genre of writing, format of the manuscript, and language.

world. The *International Journal of Science and Mathematics Education* has been provided with funds to support non-English speaking authors in the editing stages of their manuscripts. Whether publication practices in the discipline will change as a result, and whether there are similar or different trends for the two journals (the former listed in ISI, the latter not listed) would allow for additional refinements in models concerning the stability (or instability) of publication practices, will be an empirical matter for future analyses.

Citation is an emerging (reflexive) practice, in that citations stabilize journals and authors and keep others out of existing citation networks. As decisions about authors are made with respect to their impact on the field, reflexively determined by their ability to publish in the »flagship journals,« there is little motivation to bring about and support forms of publication (i.e., e-journals) that for a variety of reasons discussed here fail to contribute to citation networks. Citation analysis implies a reflexive theory. While such a theory has not (yet) been articulated, the present article provides a glimpse at some of the processes that stabilize journals, citations, and authors, in part because of the role they play with respect to tenure, promotion, salary, and funding decisions.

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