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Boundary-Work in the Health Research Field: Biomedical and Clinician Scientists' Perceptions of Social Science Research

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Abstract Funding agencies in Canada are attempting to break down the organizational boundaries between disciplines to promote interdisciplinary research and foster the integration of the social sciences into the health research field. This paper explores the extent to which biomedical and clinician scientists' perceptions of social science research operate as a cultural boundary to the inclusion of social scientists into this field. Results indicated that cultural boundaries may impede social scientists' entry into the health research field through three modalities: (1) biomedical and clinician scientists' unfavourable and ambivalent posture towards social science research; (2) their opposition to a resource increase for the social sciences; and (3) clinician scientists procedural assessment criteria for social science. The paper also discusses the merits and limitations of Tom Gieryn's concept of boundary-work for studying social dynamics within the field of science.

Keywords Boundary-work · Culture · Health research · Interdisciplinary research · Scientific field · Symbolic boundary

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Introduction

Does non-experimental research have less value than experimental research? Is there a hierarchy between research methods with respect to their scientific rigor? Are qualitative methods only useful for conducting pilot research? As much as these questions may sound irrelevant to social scientists, in the context of the health domain, they constitute real concerns for those who interact with clinician and basic scientists. Social scientists working within this domain find themselves in unfamiliar terrain and regularly need to overcome experimental scientists' misappreciation of the social sciences in order to gain legitimacy (Albert et al. 2008).

To foster the integration of the social sciences within the health research field, governments and funding agencies have taken steps in recent years. In Canada, the Medical Research Council was replaced in 2000 by the Canadian Institutes of Health Research (CIHR) and given an expanded mandate which included the promotion of interdisciplinary research on a wide range of determinants of health rather than research restricted to a more traditional biological focus. The new areas targeted by the CIHR include the cultural, social, economic, and environmental determinants of health (CIHR–Canadian Institutes of Health Research 2003, 2005; Government of Canada 2000). Similarly, the National Institutes of Health (NIH) in the United States has recently decided to allocate funds for the development of methodologies aimed at integrating behavioral and social science into interdisciplinary health research (Bachrach and Abeles 2004; NIH–National Institutes of Health 2007).

However, social scientists working in the health research field have reported that their integration continues to be challenging in practice (Bernier 2005; de Villiers 2005; Williams et al. 2002). Indeed, funding agencies' attempts to break down the organizational boundaries between disciplines do not ensure that cultural boundaries will naturally fade away. It could be argued that there is a certain idealism in thinking that social scientists will be able to readily connect with biomedical and clinician scientists and flourish in the health domain once organizational roadblocks are removed. We believe that organizational boundaries are only one factor among others influencing interdisciplinary collaboration and that cultural boundary also need to be taken into account. In keeping with this thesis, and building on a previous study on biomedical scientists' views of social science (Albert et al. 2008), this paper explores the extent to which biomedical and clinician scientists' perceptions of social science research operate as a cultural boundary to the integration of the social sciences into the health research field. This article is thus concerned with biomedical and clinician scientists' definition of legitimate science and their assessment of social science research.

Understanding the perceptions of biomedical and clinician scientists as they relate to the social sciences is critical because of the high status these groups typically hold in the health research field, and consequently the symbolic power they wield over it (Clarke 2001; Clarke et al. 2003; Gordon 1988). As a result, their perceptions (e.g., favourable or unfavourable) are endowed with the power to influence the entry and status of social scientists within this field.

Asking biomedical and clinician scientists what they think of social science research is tantamount to asking them to perform discursive "boundary-work" (Gieryn 1995, 1999): Are they willing to redraw the boundaries of legitimate health research to allow the entry of social scientists in a territory they have occupied for decades? More specifically, are they willing to redefine "good" science in a way that would allow the inclusion of non-experimental and non-clinical research? Although our study is informed by Gieryn's work, we depart from it in two ways. First, while Gieryn's studies have focused on historical cases, our own study observes boundary-work in the making by asking two groups of scientists (biomedical and clinician scientists) to give their opinion on the research practices of another one (social scientists). Second, while Gieryn devoted most of his effort to analysing boundary-work demarcating science and non-science, our study examines boundary-work between groups of scientists within the scientific field. This focus is in keeping with a growing body of research that examines the struggle for legitimacy between disciplines and medical specialties using Gieryn's concept of boundary-work (Amsterdamska 2005; Burri 2008; Calvert 2006; Gaziano 1996; Ramsden 2002).

Literature Review

Our study builds on research that conceptualizes disciplines and scientific practices as social institutions, each characterized by its own distinctive culture. Within this literature, various concepts have been developed to grasp the cultural dimension of disciplines and scientific practices: "disciplinary habitus" (Bourdieu 2004), "epistemic culture" (Knorr-Cetina 1999), and "academic tribes" (Becher and Trowler 2001). Despite their difference in focus, these concepts all emphasize that scientists are social actors who are members of scientific communities and therefore embedded in a community-specific (nonetheless porous) web of significations. These authors define disciplinary and scientific cultures as taken-for-granted ways of thinking about and doing science; for example, cultures include shared assumptions about what "good" science is, what method is best to generate valid results, how data should be collected and interpreted, and what constitutes a productive scientist. In each discipline, or community of scientists, apprentices internalize the inherited culture of the group through extended immersion and participation in this culture (Bourdieu 2004). They not only develop a skill set for conducting research, but also acquire a way of understanding science. While Bourdieu, Knorr-Cetina, and Becher and Trowler have shown that communities of scientists exhibit many features of cultural groups, they have not studied how scientists exercise judgment within the context of increasing expectations of cross-disciplinary research. Our study constitutes a first attempt to shed light on this aspect of cross-disciplinarity.

Another body of work, focusing on interdisciplinary research, has shown that interaction is easier when scientists come from communities that share affinities in terms of their epistemological assumptions and general view of science (e.g., biochemistry and chemistry) than when they come from more distant communities (e.g., biomedical and social sciences) (Bauer 1990; Lau and Pasquini 2004; Lélé and

Norgaard 2005; MacMynowski 2007; Redclift 1998; Sillitoe 2004; Stokols et al. 2003). In this latter context, the challenges for interdisciplinary collaboration lie beyond communication difficulties alone and concern epistemological issues. Since these issues rest on scientists' beliefs about the very nature of what they do, they can trigger tensions and debates between experimental and social scientists (Jeffrey 2003; MacMynowski 2007; Stokols et al. 2003—see also on cross-disciplinary assessment, Guetzkow et al. 2004; Lamont et al. 2006; Porter and Rossini 1985).

In addition to this potential epistemological divide between the biomedical and the social sciences, several medical anthropologists in public health sciences have reported a lack of parity between the social and health sciences as to their perceived scientific authority (Barrett 1997; Foster 1987; Kendall 1989; Lambert and McKevitt 2002; Napolitano and Jones 2006). These authors have stressed that epidemiologists and clinician scientists perceive the social sciences as an activity of lower scientific importance. As a result, social scientists tended to be restricted to subordinated roles in interdisciplinary research teams and have access to only limited financial resources. This literature resonates with Bourdieu's work on symbolic power: those who hold symbolic power within a field are those whose judgments are most influential when it comes to such things as the allocation of material resources (Bourdieu 1975, 1993, 1996, 2004).

The literature on cross-disciplinary interaction stresses the central role of culture in how scientists engage with their peers from other disciplines. However, the bulk of the work in the health domain remains in the form of essays (rather than empirical research) produced by researchers reflecting on their own experiences in interdisciplinary research teams. Building on these essays, our goal is to explore empirically the meeting of different scientific cultures by examining how biomedical and clinician scientists perceive the social sciences. In the current move toward interdisciplinary research we argue it is vital to understand how scientists from different backgrounds and with different degrees of scientific authority (e.g., symbolic power) perceive and judge one another. These perceptions can shape not only their attitude toward collaborative work, but also the very structure of the scientific field in terms of the allocation of the material and symbolic resources.

To better grasp the relational significance (Bourdieu and Wacquant 1992; Emirbayer 1997; Vandenberghe 1999) of biomedical and clinician scientists' perceptions of the social sciences, we also asked social scientists to comment on their own research practices. Exploring how social scientists perceive themselves—and how they define science more generally—allowed us to better map out the divergence and convergence between their views and those of the biomedical and clinician scientists.

Methods

Sampling Procedure

We conducted semi-structured interviews with 94 scientists who are members of peer review committees at the Canadian Institutes of Health Research (CIHR). This

sample consisted of 31 biomedical scientists, 30 clinician scientists,[1] and 33 social scientists. We selected scientists sitting on peer review committees because members of these committees are generally considered by their peers to embody an institutionalized definition of scientific excellence (Guetzkow et al. 2004). In this sense, biomedical and clinician scientists' perspectives on the social sciences are likely to be indicative of prevailing opinions in the health sciences, whereas social scientists' perspectives on their own research practices are likely to be indicative of the predominant views among social scientists working in the health domain.

Participants were selected through purposeful sampling (Creswell 1998). We sought a variety of profiles in order to represent as effectively as possible the diversity of biomedical, clinician and social scientists' perspectives on the social sciences, thus avoiding the over-representation of one particular group's way of thinking. Accordingly, we targeted individuals from a range of research areas, CIHR committees, and institutional affiliations (department and university). The number of respondents interviewed in each scientific community was determined by using the saturation approach: new participants were added to our sample until the variety of opinions and judgments expressed was exhausted (Strauss and Corbin 1998). A preliminary analysis was thus conducted after each interview. Table 1 summarizes the main characteristics of the sample.

The Interview Guide

In the context of the larger research project of which this study is a part, we developed an interview guide with 34 semi-structured questions covering nine themes related to interdisciplinary research in the health domain. Two themes, focusing specifically on the biomedical and clinician scientists' perceptions of the social sciences, were analyzed in detail for this paper. These themes were: (1) general opinions concerning the value of the social sciences in the health domain, and (2) appraisal of different research methods—experimental, quasi-experimental, qualitative and quantitative survey approaches—particularly with respect to their perceptions of the relative value/merit/legitimacy and validity of each approach. We also explored, using the same themes, the social scientists' perceptions of their own research practices.

Data Collection

Interviews lasted between 60 and 90 min and were audio-recorded with the participants' consent. Phone interviews were used as the participants were affiliated with universities spread across Canada. Three interviewers conducted the interviews; two of them were social scientists and the third was a physician with a Masters' degree in social science. We decided to include a physician on our team because we were concerned that biomedical and clinician scientists would be inclined to manifest "political correctness" with the social scientist interviewers.

[1] We preferred the designation '*clinician* scientists' to '*clinical* scientists' because clinicians' research activities are not restricted to clinical research, such as clinical trials and case reports, and may include activities intersecting to some degree either with social science or basic science.

Table 1 Main characteristics of sample

Gender	
Men	$n = 54$
Women	$n = 40$
Academic rank	
Professor	$n = 48$
Associate professor	$n = 31$
Assistant professor	$n = 15$
Number of years as faculty	
Mean	15
Standard deviation	8.5
Min	2 years
Max	34 years
Scientific groups	
Biomedical scientists	31
Clinician scientists	30
Social scientists	33
Number of CIHR committees	$n = 33$
Number of university affiliations	$n = 23$

The comparison of interviews conducted by the physician and the social scientists, however, showed that our concerns were unjustified.

Data Analysis

The data were analyzed by thematic content analysis. First, categories were generated reflecting the various positions expressed by all respondents with regard to each theme. Second, each interview was analyzed based on these categories (vertical analysis). Third, the data were examined from a comparative perspective across respondents (transversal analysis). Two investigators analyzed the interviews. Each one independently read and coded all interviews. Their respective coding structures were then compared. Any differences in interpretation were resolved through discussion until a consensus was obtained.

To get a synoptic overview of how receptive or unreceptive biomedical and clinician scientists were toward the social sciences, we converted into quantitative data some of the results of the qualitative analysis relating to respondents' perceptions of social science research. For comparative purposes, the same procedure was applied to social scientists' responses. It must be stressed that the aim of this quantitative conversion was *not* to statistically test a hypothesis, but solely to provide an additional descriptive analysis that would help identify the major trends in biomedical and clinician scientists' receptiveness to the social sciences and in social scientists' appraisal of their own research practices. Our quantification of the qualitative data proceeded as follows. First, a numerical value was attributed to the responses given by the participants to each of five semi-open questions targeting their perception of non-experimental methods (i.e., quantitative and qualitative social science methods) and the validity of the knowledge generated with these methods

(see Appendix for the list of questions used). This was done using a five-point Likert-type scale with anchors that captured various degrees of receptiveness to the social sciences (1: unreceptive, 2: somewhat unreceptive, 3: ambivalent, 4: somewhat receptive, and 5: receptive). We assumed that biomedical and clinician scientists' perceptions and judgements of the methodologies characteristic of the social sciences would be a key expression of their scientific culture. Moreover, given that biomedical and clinician scientists might not have been able to position themselves on either the substantive content or the theoretical relevance of social science research, methodological issues appeared to be the only common ground on which biomedical and clinician scientists could base their assessment of the scientific value of social science research. The same Likert scale was used to account for the social scientists' assessment of the social sciences, with a minor variation. Because social scientists are themselves internal to the field of social science, the wording of the anchors was changed slightly to capture their positive or negative "appraisal" of the field, rather than "receptivity". The underlying construct sought during the use of the scale for both groups was the same: that of positive or negative "stance" toward the social sciences. The rating scales were applied to each of the 5 areas addressed in the interview, yielding 5 sub-scores of the stance of each participant.

Because all respondents were asked to comment on issues related to non-experimental methods and the social sciences throughout the interview (i.e., outside of the five selected questions that directly related to methods) we were also able to make an overall rating of how receptive the biomedical and clinician scientist participants were toward social science research. To do this, the same five-point scale was used to assign an overall score on the basis of the whole interview. By taking into account the entire context of the interview, we increased our confidence in the interpretation of the participants' responses to individual questions. Two investigators separately conducted the quantitative scoring. In the rare instances of discrepant scores, consensus was reached through discussion. We then proceeded to calculate the mean value for each participant's compiled score on all six ratings in order to create a score reflecting his or her overall degree of receptiveness toward the social sciences (for the biomedical and clinician scientists) or his or her overall appraisal of social science research (for the social scientists). This score allowed us to position each respondent on a continuum ranging from 1 to 5, with 1 indicating a highly unreceptive posture or negative appraisal, and 5 a highly receptive posture or positive appraisal. For the purposes of comparison and clarity of data presentation in Figs. 1 and 2 below, we call this overall score their "stance".

Findings

Two salient trends stand out from the results for the biomedical and clinician scientists.[2] First, both clinician and biomedical scientists' receptiveness scores

[2] We acknowledge that the biomedical and clinical sciences differ significantly in the methods they use and the goal of their scientific endeavor (see Knorr-Cetina 1999, on scientific cultures in basic sciences). We took into account these differences when relevant. However, for the purpose of this paper we decided to consider biomedical and clinical sciences together for two reasons: (1) both are grounded on the

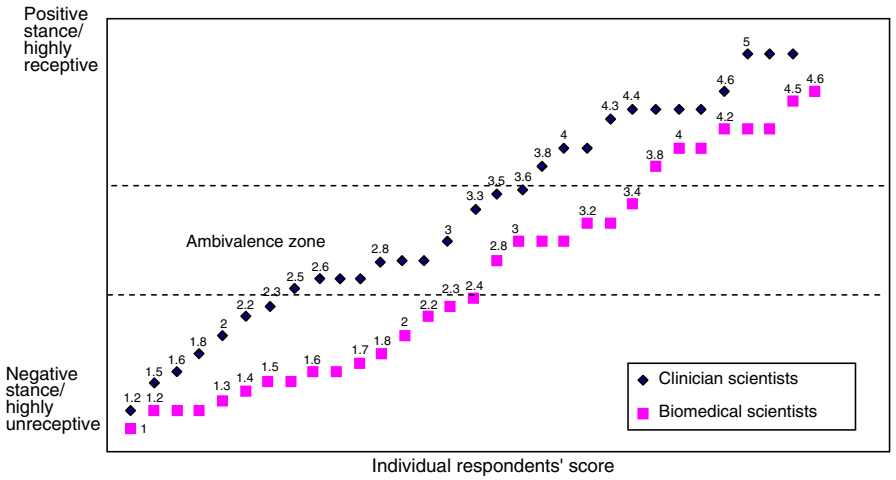

Fig. 1 Biomedical and clinician scientists' stance on social science research

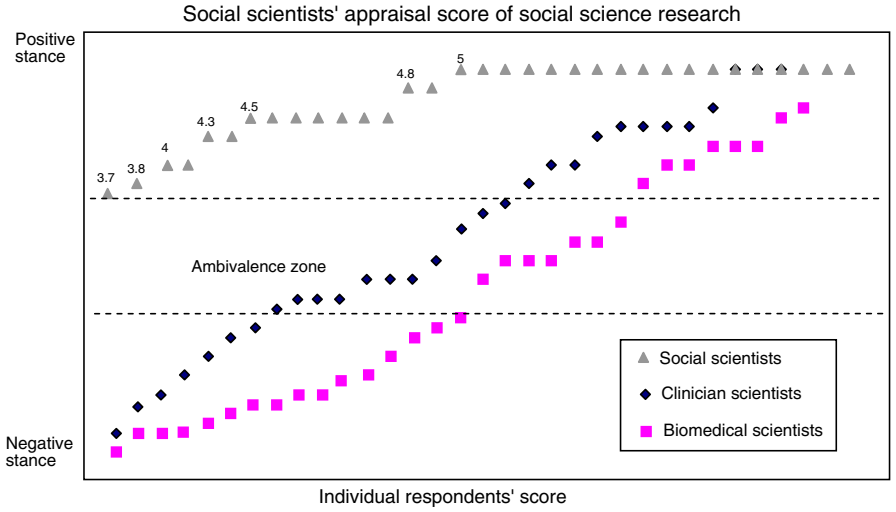

Fig. 2 Social scientists' appraisal score of social science research

ranged widely, from a very negative stance to a very positive one. Neither group was homogeneous when it came to assessing social science research: biomedical scientists' mean scores ranging from 1 to 4.6, and clinician scientists' from 1.2 to 5 (see Fig. 1). Second, clinician scientists tended to be somewhat more receptive to the social sciences than were biomedical scientists. While approximately half of the

Footnote 2 continued
premise that the experimental method epitomizes legitimate research procedure; (2) both occupy a dominant position in the health research field, and thus possess the power to act as the arbiter of legitimate science.

clinician scientists tended to be receptive to social science research (12 of 30, with mean scores ranging from 3.8 to 5), only one quarter of the biomedical scientists exhibited the same posture (8 of 31, with mean scores ranging from 3.8 to 4.6). Conversely, while approximately half of the biomedical scientists tended to be unreceptive toward the social sciences (16 of 31, with mean scores ranging from 1 to 2.4), only one quarter of the clinician scientists showed a similar *un*receptiveness (7 of 30, with mean scores ranging from 1.2 to 2.3). In order to assign meaning to these numbers, we considered respondents with a score falling in a band between 2.5 and 3.6 as representing ambivalence, because the individuals with these scores appeared to alternate between a favourable and unfavourable stance toward the social sciences depending on the specific issue addressed. Seven of the 31 biomedical scientists fall into that category with mean scores ranging from 2.8 to 3.4, while 11 of 30 clinician scientists manifested a similar posture with mean scores ranging from 2.5 to 3.6 (see the Ambivalence zone in Fig. 1).

Could biomedical and clinician scientists' perceptions of social science research act as a cultural boundary to the integration of the social sciences into the health research field? These quantitative results showed that biomedical and clinician scientists differed importantly in this regard and that biomedical scientists would be much more inclined than clinician scientists to establish a cultural boundary hindering social science research entry and development in the health domain. As indicated by Fig. 1, approximately half of biomedical scientists (16 of 31) were unreceptive to social science while only one quarter of the clinician scientists manifested a similar unfavourable posture (7 of 30). It is thus arguable that biomedical scientists' unfavourable judgment could potentially have a greater "negative" impact on the allocation of material and symbolic resource to social scientists than clinician scientists'. Although we have not examined concrete manifestations of this impact—which is beyond the scope of this study-, drawing on Gieryn's and Bourdieu's large body of work on symbolic boundaries, we argue that these cultural boundaries could be enacted in a variety of decision-making instances, such as university strategic planning committees, funding agency executive boards, governmental scientific advisory bodies, and peer-reviewed committees.

Let's now turn to the results for the social scientists. How did they appraise the research practices of their field and to what extent do their appraisals converge or diverge from the biomedical and clinician scientists' perceptions? Unsurprisingly all social scientists appraised favourably the research practices within their domain, with mean scores ranging from 3.7 to 5 (see Fig. 2). Besides this unanimous favourable appraisal, what stands out is the stark contrast between biomedical and clinician scientists' perceptions of the social sciences and social scientists' perceptions of their own field. The divergences between the two groups are more salient than the convergences. These contrasting views suggest the strong possibility of a cultural clash between the social scientists and the biomedical and clinician scientists over the definition of legitimate research. They also raise questions about the very feasibility of an interdisciplinary environment in health research favourable to the social sciences. Indeed, it might be challenging for social scientists to

integrate and strive in a field where a majority of biomedical and clinician scientists seem to be either unfavourable or ambivalent toward their research practices.

We will now explore in greater detail the respondents' receptiveness and appraisal of social science research. We will focus first on the rationale offered by biomedical and clinician scientists to justify their position toward social science research. We will then explore the views of social scientists toward their own research. The code in parenthesis following interview extracts corresponds to the respondent's identification number (BMS = biomedical scientists, CLS = clinician scientists, SSC = social scientists).

Biomedical and Clinician Scientists' Rationale for Receptiveness to Social Science Research

The content analysis revealed that biomedical and clinician scientists who were receptive to the social sciences used two key interrelated arguments to support their posture. First, social science research questions are just as relevant as those of the biomedical and clinical sciences; second, the methods typically used in the social sciences, both quantitative and qualitative, are as scientific and rigorous as those used in the biomedical and clinical sciences. Moreover, the receptive scientists acknowledged that there are important aspects of health that can only be studied by the social sciences. This observation was often accompanied by an explicit recognition of the scientific legitimacy of the methods typically used in the social sciences. Both receptive biomedical and clinician scientists shared the same opinion on this issue:

> My impression is that the social sciences are necessary in health because we must not forget that there are also social determinants of health. To study them properly we must use the most appropriate methods. I think we don't have to make up a hierarchy of "rigor" among research methods. There are questions that cannot be answered by anything other than qualitative methods and we need to know how to use them. (01BMS)
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> Qualitative research methods have been well enough developed over the last 25 years in health that there's a very strong role for answering certain types of questions in a way that's quite rigorous and quite sound. So, research methods can't be ranked in any way as being better or not. (03CLS)

For most of the receptive biomedical and clinician scientists, the legitimacy of a method, whether it be experimental, quasi-experimental, quantitative or qualitative, essentially depends on its capacity to adequately respond to a research question and not the degree to which it conforms to a given scientific paradigm. Accordingly, these scientists appear to be very little inclined, at least discursively, to draw a symbolic boundary between their research practices and those of the social scientists. In their views, there are no universal criteria that would make it possible to determine a priori the superiority of one method over another. Rather, as emphasised by a respondent, the researcher must decide which method is the most appropriate for each particular question:

> If your question is why a phenomenon occurred and you want to get an in-depth understanding, it sounds like it's very qualitative in nature. Therefore that methodology is the rigorous one to use. On the other hand, if I want to know which therapy is best, I won't be using a qualitative method. As a scientist, you are supposed to be answering questions, not trying to figure out what method you are supposed to use. The method should be based on the question posed. (18CLS)

It is noteworthy that many of the receptive biomedical and clinician scientists showed a critical posture toward their own research practices, whether they engage in laboratory sciences or clinical research, such as randomized controlled trials (RCTs) and clinical epidemiology. It is conceivable that this self-reflective attitude may have supported openness to other types of scientific practices, such as those of the social sciences. These participants acknowledged that there is an element of subjectivity and interpretation in both the experimental/clinical sciences and the social sciences. In their view, subjectivity and interpretation are to be found in the experimental and clinical sciences in three main areas: (1) the framework used to inform the research question and interpret the results, (2) the technical apparatus and data collection procedures, and (3) the scientist's subjective decision regarding what is appropriate to do at the various steps of the research:

> In experimental science, results depend so much on how the experiment is set up and on the approach used that even in the most rigorously designed research project there is always a non-objective component. (17BMS)
> It's not fair to critique the social sciences by saying they interpret data because we do that all the time in basic science when we get data that doesn't fit with what we expect. When that happens, we start looking at alternative explanations. So, my first answer would be that there is more bias in social science, but if I were really thinking critically–which we don't often do–I might probably be willing to sit on the fence and say it is probably the same in basic science. (27BMS)
> The words 'subjective' and 'objective' should no longer be used. Objective is things like experimental research or what a machine produces as a result, but all of those outcomes are influenced by the subjective decisions of a scientist that they are appropriate. (24CLS)

Methodological Assessment Criteria of Social Science: A Boundary Tool?

Although approximately half of the clinician scientists appeared to be receptive to social science research (see Fig. 1), the kind of social science they are receptive to may not be the type that social scientists necessarily conduct. Data from the interviews and from the abundant literature published in recent years in clinical journals describing what "good" social science is (Giacomini and Cook 2000; Greenhalgh and Taylor 1997; Kuckelman Cobb and Sarah 2002; Mays and Pope 1995, 2000; Meyrick 2006; Rowan and Huston 1997; Rychetnik et al. 2002) strongly suggest that clinician scientists adhere to a set of assessment criteria that social scientists may not be themselves prioritizing. These criteria predominantly focus on research procedure (i.e., *how* the study is conducted), and pay little

attention to the substance of the work (its contribution to knowledge and theoretical advancement, its originality, etc.). Accordingly, "good" (qualitative)[3] social science research is defined as research that makes use of methodological tools such as "multiple coding", "purposive sampling", "sample saturation", "triangulation", "member checking",[4] "peer debriefing",[5] and "audit trail".[6] The presence or absence of these tools is thus perceived as indicative of scientific quality.[7]

To explore to what extent clinician scientists in our sample stand by this procedural approach to assessment, we asked them to comment on four criteria proposed by the *British Medical Journal* for assessing (qualitative) social science research.[8] A clear majority of respondents (including the receptive ones) considered all four criteria to be appropriate (between 70% and 90% depending on the criterion). Although these results cannot be taken as a confirmation that the clinician scientists we interviewed privileged a procedural approach to assessment, they support the claim that clinician scientists tend to gauge quality in terms of the execution of particular methodological procedures.[9] Further, very few clinician scientists exhibited a critical stance toward these criteria, and none questioned, either directly or indirectly, their adequacy for the assessment of (qualitative) social science research. It may thus be argued that although a good number of clinician scientists seem to be receptive to social science research, their receptiveness remains conditional to the fulfillment of specific "quality" criteria. In this sense, their favourable posture is not boundary-less, but linked to a conception of scientific excellence which seems to be aligned with the objectivist-type of approach and epistemologies that predominate in health research (usually rooted in clinical epidemiology). Moreover, as these data suggest, boundary-work is not always intentional; rather, it can also be performed unintentionally through the application of internalized cognitive categories (e.g., epistemic culture, disciplinary habitus) to

[3] For most clinician scientists, social science primarily refers to qualitative research. This perception may be due, in part, to the massive increase of articles using qualitative methods published in clinical journals in recent years (Eakin and Mykhalovskiy 2003). Several clinician scientists in our study also said themselves that they associate social science with qualitative research.

[4] Member checking refers to the verification of the findings with the research participants themselves to confirm their accuracy.

[5] Peer debriefing refers to the process of conferring throughout the study with a colleague who is not involved in the study but who has relevant expertise.

[6] Audit trail refers to the keeping of a record of all decisions made by the researcher to make it possible for an outside reviewer to repeat each stage of the research including the analysis.

[7] Our anticipation that some readers of this paper—predominantly social scientists—may be unfamiliar with some of these methodological tools attests to the disconnect between the predominant conception of "good" social science among clinician scientists and what researchers trained in the social sciences actually do and define as good science.

[8] The criteria were: (1) "Was the analysis repeated by more than one researcher to ensure reliability?" (triangulation); (2) "Could the evidence be inspected independently by others; if relevant, could the process of transcription be independently inspected?" (audit trail); (3) "Was the sampling strategy theoretically comprehensive to ensure the generalisability of the conceptual analyses?" (purposive sampling); (4) "Did the investigator make use of quantitative evidence to test qualitative conclusions where appropriate?" (triangulation) (Mays and Pope 1995: 112).

[9] For an insightful analysis of the procedural approach to social science assessment in medicine and its potential impact on social science research in health, see Eakin and Mykhalovskiy (2003).

a given practice. Clinician scientists in our study may not be aware that these accepted criteria for evaluation are inconsistent with many other approaches to rigorous social science research. Thus it may be argued that symbolic boundaries can be established by social actors who do not overtly aim to establish them.

All the biomedical scientists were also in agreement with the *BMJ* criteria. However, in contrast with the clinician scientists, reflecting on social science assessment criteria is for them a non-issue. Social science research is too foreign to them to even think of engaging in a discussion about its assessment.

Biomedical and Clinician Scientists' Rationale for Unreceptiveness to Social Science Research

For the biomedical and clinician scientists who had a negative perception of the social sciences, this was linked to a strict definition of "legitimate" science. This definition was characterized by three key assumptions: (1) the best science necessarily involves the performance of an intervention on variables; (2) this intervention must be done in a controlled environment[10] or with a randomized sample[11] to permit the establishment of a causal or correlational relationship; (3) results must be reproducible to ensure that they are not due to chance. Given that the social sciences, and more particularly qualitative research, cannot satisfy these criteria, the unreceptive respondents hold them to be unscientific.

Consistent with their definition of legitimate science, both unreceptive biomedical and clinician scientists asserted that there is a hierarchy among research methods. In their opinion, the experimental method was at the top of the hierarchy because it epitomizes legitimate scientific procedures. Results from experimental research are both valid and objective because they are produced in a controlled or quasi-controlled environment and are observable by any scientist performing the same experiment. Quantitative social research and epidemiology were ranked second—primarily by biomedical scientists (who rarely or never use them), and to a lesser degree by clinician scientists (who use them regularly). Although quantitative social research and epidemiology generate quantified and objective results, their statistical analyses only allow the establishment of correlations among variables rather than causal relationships. This was perceived as a weakness—mostly by biomedical scientists—since the goal of science, according to these scientists, is to uncover the causes of the observed phenomena.[12] Qualitative research is ranked last

[10] A position predominantly held by biomedical scientists.

[11] A position predominantly held by clinician scientists.

[12] The ranking of RCTs and similar statistical-based research is the only issue about which we noticed some level of disagreement between biomedical and clinician scientists. Whereas clinician scientists perceive RCT as being equal to laboratory research in terms of the validity of its results and its methodological rigour, biomedical scientists tended to rank it lower than laboratory research because it can only establish statistical relationship between variables. Despite this difference of opinion about RCT, our data clearly show that clinician scientists don't dispute the fact that experimental method represents the gold standard of scientific research. For a historical analysis of the relationship between laboratory science and statistical-based research, see Amsterdamska (2005).

by both the unreceptive biomedical and clinician scientists. They perceived it as being devoid of any scientific foundation for three main reasons: it cannot be reproduced; the researcher's subjectivity interferes at all stages of the research process; and there is no effective way to control for bias. The first two following quotes are typical of biomedical scientists' rationale for their ranking; the last one is typical of clinician scientists' standpoint:

> Many of the social sciences are basically observational; they're qualitative rather than quantitative. And more importantly they look for relationships without addressing causality, because there's no experiment done. For example, if you surveyed a hundred people to see whether or not stress is associated with depression, that doesn't establish causality. All it does is establish a relationship. So that's weak science. I know epidemiology is currently in favor, but it's all weak science because there's no experiment done. (10BMS)
>
> The experimental approach, where the focus is on a specific component of a larger picture, is best. You pick the pieces you are going to try to put together and then see how it goes. As you go down the hierarchy you start losing control and you're getting more into interpretation. (27BMS)
>
> In whatever clinical trials we do, we want to have the appropriate controls. We like to know what's there before the treatment, and what the changes are after. We like to look at multiple points in time, and this is not possible with qualitative study. (19CLS)

Because of the numerous limitations that unreceptive respondents (both biomedical and clinician scientists) perceived in qualitative research, many asserted that its role should be limited to preliminary phase of scientific study:

> Qualitative methods certainly give an indication of what might be happening, but they have to be followed up with more rigorous quantitative data collection and analysis. (03BMS)
>
> I look at qualitative research as hypothesis generating because there is more risk of error than in quantitative methods and the precision tends to be softer. (28CLS)

In contrast to their colleagues who grant legitimacy to the social sciences, the unreceptive biomedical and clinician scientists do not seem to endorse the idea that one may use different methods depending on the nature of the research question. For them, research questions that do not lend themselves to laboratory experimentation (a position predominantly held by biomedical scientists) or to statistical analysis such as in RCT or epidemiological study (a position predominantly held by clinician scientists) cannot be studied in a scientific manner. For these scientists, the boundary demarcating science from non-science is clear-cut and sealed-off. Any intent to redraw it for the purpose of integrating the social sciences in the health research field would be perceived as compromising with what they believe true science is.

Biomedical and Clinician Scientists' Rationale for their Ambivalent Posture Toward Social Science Research

Like the unreceptive respondents, ambivalent biomedical and clinician scientists tended to exhibit a hierarchised view of science; they placed the experimental method at the top of the hierarchy and qualitative research at the bottom. However, of critical difference, ambivalent respondents viewed all forms of inquiry, including qualitative research, as scientific endeavours. In their view, there is no cut-off point at which academic research practice falls outside the scientific field. The following quotes exemplify their hierarchised receptiveness towards social science research:

> I acknowledge that qualitative and quantitative methods are used for different purposes, but from the perspective of validity I would say that experimental methods and randomized trials are number one. (21CLS)
> Although the methods one uses depends on the research question, I still believe the more aspects of the research you can measure and control the more objective and rigorous the conclusion can be. (08CLS)

In the wake of the growing influence exerted by evidenced-based medicine in medical circles, many respondents (mostly clinician scientists) also asserted that health research should primarily devote its effort at generating evidence to better ground medical practice in scientific knowledge. The perception that qualitative research is unable to generate such evidence was part of the reason these respondents developed an ambivalent posture:

> Qualitative methods work very well under certain circumstances. But when talking about best evidence, I believe that RCTs and surveys provide better evidence for decision making than qualitative methods. (20CLS)

Other ambivalent biomedical and clinician scientists argued that findings from qualitative methods should be supported by quantitative data when possible:

> I think that when we have a finding from a qualitative study, we must try to verify it as much as possible in a quantitative manner. We say that numbers talk; so it's better when we can quantify results. (14BMS)

The ambivalent posture of these respondents is not well captured by Gieryn's concept of boundary-work, which tends to frame the struggle for scientific authority as dichotomous; that is, groups who compete for scientific authority either succeed or fail in representing their work as scientific. Those who succeed occupy what Gieryn calls the "space marked 'science'" (1995: 406), while those who fail are rejected from that space. This framework does not effectively capture the kind of boundary-work performed by the ambivalent respondents. These respondents don't exclude social scientists from the scientific field, but impose on them their own hierarchical classification of science.[13] Based on that classification, experimental

[13] Exploring the reasons why ambivalent biomedical and clinician scientists don't want to reject social science from the scientific field is beyond the scope of this paper. However, we may hypothesise that some of them have been exposed to social science research and have developed, to a certain degree, an openness to it (Albert et al. 2008).

research gains access to the greatest volume of symbolic and material resources, while other kinds of research, although still considered scientific, do not warrant the same level of resources because of their perceived lower scientific value. Since Gieryn's concept of boundary-work primarily focuses on the struggle for demarcating science from non-science, it appears ill-suited to capture the power struggle occurring *within* scientific fields for the establishment of the hierarchical structure between scientific practices.

Opposition to Resource Redistribution: A Boundary Tool?

Boundaries can also be created by biomedical and clinician scientists' opposition to a resource redistribution to facilitate social science integration in the health research domain. When asked if the social sciences should benefit from a catch-up budget or from an increase in the number of peer-review committees devoted to the social sciences at the CIHR,[14] the vast majority of biomedical and clinician scientists said "no" without hesitation. If this opposition is understandable coming from the unreceptive respondents, and, to a certain extent, from the ambivalent ones, it appears somewhat paradoxical coming from the receptive respondents (17 of the 20 receptive biomedical and clinician scientists were against allowing a resource increase for the social science). This unexpected opposition from the receptive respondents suggests that loosening up symbolic boundaries does not necessarily imply the willingness to remove material boundaries. When a field has limited resources, even those social actors who have shown an attitude of openness to newcomers may be reluctant to share their resources with them.

Receptive respondents, in addition to those who were unreceptive or ambivalent, gave three main arguments to explain why they were not in favour of resource redistribution. First, there is already an organization dedicated to funding social science research in Canada (the Social Sciences and Humanities Research Council). There is, therefore, no need for the CIHR to allocate a catch-up budget or increase the number of peer-review committees with social science representatives. Second, because biomedical and clinician scientists are already under-funded, providing additional support to the social sciences would further reduce their access to material resources. Finally, funding has to be attributed based on merit, which is measured by conformity to the experimental method. Therefore, the same quality criteria used for biomedical and clinician scientists should be used to evaluate all science including the social sciences. This third argument could be interpreted as being in contradiction with the openness manifested by the receptive respondents toward non-experimental methods. Alternatively, it may indicate that these scientists are more likely to loosen symbolic boundaries when nothing is perceived to be at stake. However, when the sharing of material resources is considered, their receptiveness to social scientists entering the health research field may prove to be

[14] At the time of the study, approximately 18% of the peer-review committees at the CIHR (10 of 54) had *some* expertise for assessing social science research projects. Although these committees were not specifically devoted to social science, they included at least one panelist with *some* acquaintance with social science.

quite superficial. The following quotes, taken from interviews with receptive respondents, highlight the rationale supporting the two last arguments:

> I'm a basic scientist. I know there is a lack of resources in my discipline. So I'm ready to fight for that. To defend this, I'll dig anywhere I can to find the necessary resources. In this context, I think it would be unfair to give the social sciences more money. (17BMS)
>
> I'm absolutely against the idea of giving more money to the social sciences, because what you're going to do is take money from superior science and put it into inferior science. And I don't think you breed a culture of excellence by demanding mediocrity. You don't get a good scientific culture by saying: 'Oh, you guys don't have to be as good'. (10CLS)[15]

Social Scientists' Views of Social Science Research

Social scientists' views of social science research stand in total opposition to those held by the unreceptive and ambivalent respondents. Their positions literally collide. But besides this (somewhat predictable) cultural clash, what struck us the most was the general posture adopted by social scientists when reflecting on their own research practices. As if they were trying to justify the legitimacy of their own work, their responses were both defensive and critical (and at times infused with a somewhat bitter undertone) of experimental science, RCTs and clinical epidemiology. Instead of highlighting the specificity of their own contribution to scientific knowledge and population health, they frequently challenged the epistemological assumptions of experimental science and biomedical and clinician scientists' belief in the superiority of their science.

Social scientists strongly stressed that biomedical and clinician scientists are deluding themselves in thinking that experimental research and statistical-based study such as RCTs and clinical epidemiology have lesser bias than social science research (including qualitative research). For them, experimental and statistical-based research is not, in any way, more objective than social science research:

> When biomedical scientists say they don't have any bias, they're wrong. They don't understand that their bias is expressed in the particular kinds of questions they ask. They should be more explicit about what their framework is and what their values and concepts are. I don't see them as being objective. (19SSC)
>
> There are many sources of bias in experimental sciences that are not acknowledged. Biomedical scientists are fooling themselves. I don't think social sciences are unbiased, I just think that experimental sciences are far more biased than scientists believe to be. (29SSC)

[15] Although this respondent was classified as receptive, the receptiveness score he was attributed is 3.8, which places him at the lower end of the receptive respondent category (see Fig. 1). His low score among the receptive category may explain why he/she tends to show some reservation about social science as the ambivalent respondents did.

> Let's not fool ourselves; human beings hold preconceptions regardless of where they come from and what they are doing. So it's just as possible for people working in the natural sciences to have their own preconceptions as it is for social scientists. (32SSC)

Expanding their reflection to broader epistemological issues, numerous social scientists articulated an anti-objectivist philosophical standpoint. Most of them emphasized that science is neither neutral nor value-free. Again, the way they framed their arguments manifested their defensive and critical posture toward experimental and clinical research. Although they were discussing epistemological issues, their comments had a critical overtone about the dominant research model in health:

> There is no such thing as value-free science. They all reveal particular worldviews, and for that reason I don't think there's a hierarchy between them. I don't feel that there's any such thing as objective data. I don't think that with any method you're any closer to the so-called "real" in the world, because fundamentally you interpret observations through discourse and that's where your worldviews enter in. (04SSC)
>
> All research questions originate within a historical, political and funding context. So the study design itself in experimental research is not free of these influences. So I don't think that there is any less bias in that kind of research than in qualitative research. (24SSC)
>
> When we teach methods in social science we teach people to think how the knowledge is created and how social conditions shape what you know. In an epidemiology course where you're teaching clinical statistics and trial design, it's completely technical. There's no space for considering issues of whose bodies get included in the trial and how does that relate to the kind of knowledge produced. (03SSC)

Social scientists also contended that biomedical and clinician scientists are overly confident in the capacity of their methods to find the "truth" about any question. Some argued that this attitude is linked with their lack of self-reflexivity with respect to their research practices:

> What is often ignored in the experimental sciences is the inherent bias associated with the belief that experimental design will answer all questions. They believe that all you need is experimental methods. (02SSC)
>
> There's not a strong self-reflexivity around the limits of experimental methods and RCTs. There's no tradition of internal critique within them other than, at the most, sort of banal technical criticism of how best to randomize something or how best to allocate the different kind of control groups. There's no broader, sort of philosophy of knowledge engaged in. (03SSC)

In connection with this issue of over confidence and self-reflexivity shortage, several social scientists argued that biomedical and clinician scientists are blind to the fact that their methods have limited validity:

> I think that some scientists have a misplaced allegiance to randomized controlled trials and experimental methods where in fact there are a lot of

reasons to believe that there is not much external validity to many of those kinds of studies. (05SSC)

Drawing on Bourdieu's concept of field (1975, 1992, 1993) and cultural theory (1984), we may interpret social scientists' defensive and critical posture as reflecting their low scientific authority in the health research field and as a manifestation of their struggle to increase their legitimacy by trying to reorder the hierarchy between scientific practices. Because of the nature of their research (mostly non-experimental) and their research objects (generally focusing on social processes), social scientists are unlikely to conform to, and therefore reproduce the dominant research practices in health. Thus, their only "weapon" to gain recognition is to challenge the experimental model (including RCTs and clinical epidemiology) by engaging in a symbolic struggle (a "subversion strategy" in Bourdieu's term 1993: 73) with biomedical and clinician scientists.

In comparison, biomedical and clinician scientists commented on the social sciences without being defensive or challenging. As if they were confident of the legitimacy of their own science they conceived social science as a different kind of activity than their own, either equally valuable (a view expressed by the receptive biomedical and clinician scientists) or of lower or no scientific value (a view expressed by the unreceptive and ambivalent biomedical and clinician scientists). In neither case did we, interviewers, have the impression that they felt threatened by the social sciences and had to reaffirm their authority over the field.

Discussion and Conclusion

Our study has shown that cultural boundaries may impede social scientists' entry and development in the health research field through (at least) three modalities: (1) biomedical and clinician scientists' unfavourable and–to a certain extent–ambivalent posture towards social science research; (2) biomedical and clinician scientists' opposition to a resource increase for the social sciences to facilitate their integration in the health research domain; and (3) clinician scientists procedural assessment criteria for social science, which strictly defined the legitimate way of conducting social science research. The enactment of these boundaries by biomedical and clinician scientists may offset funding agencies' attempts to break down organizational boundaries between disciplines to better integrate social science research into the health research field. Our results suggest that scientific groups who have traditionally occupied the health research field may not redraw their own symbolic boundaries to be inclusive to newcomers just because funding agencies have taken steps to expand the boundaries of legitimate health research. Drawing on Bourdieu's concept of field (1975, 1993, 1996, 2004), and building on our own results, we argue, to the contrary, that the entry of a new group of scientists, with its own distinctive epistemic culture, will intensify the struggle for legitimacy—that is, for access to the symbolic and material resources available within the field—among communities of scientists working in that field. Further, the relational approach we used helped us to grasp the degree of discordance between biomedical and clinician scientists'

perception of social science research and social scientists' perception of their own research practices. Based on this result, we suggest that any scientific policy and funding program aimed at fostering cross-disciplinary collaboration between the social sciences and the biomedical and clinician sciences would need to address this. Indeed, it may be difficult for these communities of scientists to collaborate when there is disagreement on something as fundamental as the scientific value of each other's work.

Although our study has shown that biomedical and clinician scientists hold predominantly an unfavourable and ambivalent posture toward social science research, it has also shown that they are not a homogeneous group with regard to their perspective on social science research. First, both clinician and biomedical scientists' receptiveness scores ranged widely, from a very negative to a very positive posture (see Fig. 1). Second, clinician scientists tended to be more receptive to the social sciences than biomedical scientists. Although we have not investigated the reasons and factors behind these differences, two hypotheses may be put forward. First, based on our previous study of biomedical scientists' perceptions of social science (Albert et al. 2008) and other recent work (Jeffrey 2003; Stokols et al. 2003), we may argue that exposure to social science research (as long as it is a positive experience) can contribute to the development of a favourable posture. Second, clinician scientists' greater receptiveness to social science research may be explained, in part, by the fact that their research and clinical practice are oriented toward population and patients' health (Satterfield et al. 2004). The nature of their work–which deals with the complexity of real life as opposed to the controlled laboratory environment–may have thus led some of them to develop a better understanding and appreciation of social science research.

With respect to the literature in medical anthropology (Barrett 1997; Foster 1987; Lambert and McKevitt 2002; Napolitano and Jones 2006), our results bring indirect support to the claim that social scientists working in health tend to be confined to a subordinated role. Indeed, it is conceivable that biomedical and clinician scientists' predominantly unfavourable and ambivalent posture is not likely to prompt them to entrust the leadership of health research to social scientists (and pass on to them the symbolic and material resources associated with this leadership role). Thus, their negative posture may contribute to the construction and perpetuation of social scientists' subordinate status in the health domain.

On a theoretical level, Gieryn's concept of boundary-work (1995, 1999) has been helpful in highlighting various modalities through which biomedical and clinician scientists may establish cultural boundaries hindering social scientists' entry into the health research field. However, it does not appear to be as helpful for understanding why these scientists had varying levels of receptiveness towards social science research. Because the concept of boundary-work was originally forged to examine scientists' demarcation process from 'non scientific' groups, it tends to represent scientists as a relatively unified body, and thus pays only modest attention to the internal dynamic of the scientific field. As a result, Gieryn's concept may not be the most effective tool for opening the black box of the scientific field and examining questions such as those emerging from this study: How can we account for differences in the boundary-work performed by dominant scientists to preserve their

status and resources? Why are some scientists willing to include scientists from non-dominant disciplines while others draw a boundary to exclude them? Answering these questions will require a greater focus on aspects of the internal dynamic of the scientific field such as power struggles between communities of scientists, the hierarchisation process and tensions between different epistemic cultures. Examining these aspects (as well as the influences of economic and political power) would expand Gieryn's concept of boundary-work, and open a promising terrain for investigating how scientific fields operate.

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Appendix

Questions used to construct the receptiveness score

- "Many health researchers believe that there is a hierarchy of research methods, which is determined by the methodology's rigor. Do you agree that there is this hierarchy? Explain."
- "Some researchers think that qualitative research (such as studies using interviews or focus groups) is mainly to be used in the preliminary phases of quantitative research. Do you agree that this should be the primary use of qualitative methods? Explain."
- "Do you think that there are more sources of bias within the social sciences than in the experimental sciences or is it equal? Explain."
- "Do you think the fact that the social sciences (or qualitative research) are subject to a greater number of bias compromises the validity of their results? Explain."
- "The *British Medical Journal* has proposed a checklist to assess the scientific value of qualitative studies in the health sciences (Mays and Pope 1995). In the box below, 5 of these criteria are listed. Please give me your opinion on each of them. Do you think these are appropriate criteria for assessing qualitative research?" Our analysis has only scored the following 5th criterion: "Did the investigator make use of quantitative evidence to test qualitative conclusions where appropriate? Explain."

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