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# The Intersection of Sociology of Scientific Knowledge (SSK) and Law: Some Themes and Policy Reflections

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## **Abstract**

The following article provides a brief sketch of some important themes that can be drawn from studies which have investigated law/science interactions from a Sociology of Scientific Knowledge (SSK) perspective and notes some of the policy ramifications of such studies. SSK studies can be characterised by their analytical concern with linking the content of scientific knowledge and the practices of scientists to the social contexts in which scientific knowledge claims are produced and evaluated and their rejection of the idea that science is something that can be defined by its unique method and social norms (Mulkay 1979, Collins & Pinch 1993, Lynch & Bogen 1997). Many SSK/law studies have focused on controversial areas of science and law such as toxic torts, forensic science and risk and environmental regulation. The brief overview provided below will identify some important, recurrent conceptual themes rather than provide an exhaustive bibliographic survey.

# The Intersection of Sociology of Scientific Knowledge (SSK) and Law: Some Themes and Policy Reflections 1

David Mercer

## Introduction

The following article provides a brief sketch of some important themes that can be drawn from studies which have investigated law/science interactions from a Sociology of Scientific Knowledge (SSK) perspective and notes some of the policy ramifications of such studies. SSK studies can be characterised by their analytical concern with linking the content of scientific knowledge and the practices of scientists to the social contexts in which scientific knowledge claims are produced and evaluated and their rejection of the idea that science is something that can be defined by its unique method and social norms (Mulkay 1979, Collins & Pinch 1993, Lynch & Bogen 1997). Many SSK/law studies have focused on controversial areas of science and law such as toxic torts, forensic science and risk and environmental regulation. The brief overview provided below will identify some important, recurrent conceptual themes rather than provide an exhaustive bibliographic survey.

## SSK Approaches

Before outlining some of the thematic issues that have appeared across the body of SSK-influenced case studies of law and science, it is useful to outline, at a broad level, the way SSK studies have approached their subject matter.

Most traditional *non-SSK* commentators exploring the intersections of law and science commence by defining each entity and then listing similarities and differences between them (Goldberg 1994). Common themes have involved identifying similarities/differences between law and science in relation to: time constraints; burdens of proof; notions of what are classed as facts; processes of fact finding; types of rhetorical registers and style of argument involved in formulating and legitimating decisions; and, professional norms of those controlling decision-making spaces. SSK/law studies have generally avoided treating such similarities/differences as analytical categories in themselves or symptomatic of intrinsic epistemic features of each domain. Thus setting the boundaries between law and science is interpreted as an important activity undertaken by those *participating* in law science interactions, something that constitutes an important area of sociological investigation, not something to be defined on a *priori* epistemic grounds by the analyst (Edmond & Mercer 1998b, Edmond 2000b). Following from this, many studies have investigated the ways the particulars of any given legal and regulatory setting may shape the way the meaning and significance of scientific knowledge claims are determined.

SSK/law approaches have also normally proceeded by considering the importance of specific features of any given scientific debate that is entering into and being shaped by legal settings. Some disputes may involve scientific disagreement that is quite specific and restricted in time and space: such as the application of a specific forensic technique or medical assessment to a particular case. On the other hand, many disputes may be longer standing where scientific argument and legal rules are mutually refined over time. This has occurred in disputes over the scientific reliability of forensic techniques: such as fingerprinting and DNA evidence (Cole 2001) and in ranking the epistemological status of different kinds of scientific evidence in toxic torts: such as invitro vs animal experiments vs epidemiology etc (Edmond & Mercer 2000). Different scientific controversies may also involve different relationships between experts and 'publics' (Wynne 1991). In some controversies the dispute may be more local and specific, largely limited to debates within expert sub-cultures. In others, expert disagreement may be strongly linked to broader political interests. In 'toxic tort' cases, for instance: questions of financial liabilities; costs of future regulation, moral accountability and judicial fatigue, may shape both legal and scientific perceptions of standards of scientific proof required for decision-making (Edmond & Mercer 2002a). It is also important to consider that in some instances, a legal setting may be drawing on pre-existing scientific disagreement, yet in others there may be special features of the legal setting itself which are contributing to the disagreement in question.

Overall then, whilst SSK is a theoretically eclectic inter-disciplinary domain, most studies have tended to favour providing a 'thick sociological description' (Geertz 1973) of the relationship between science and

society. Law-science encounters have been explained with a focus on the ways the particulars of any legal/regulatory setting and the particulars of a given scientific controversy and links with broader social problems settings will shape the way 'law/science knowledges' are constructed. This has not militated against some generalisations about the law/science relationship being made, but it has normally been assumed that these will be made on the basis of empirical evidence and not because of the putative epistemologically essential qualities of each domain.

### **Some Common Themes**

Because SSK studies generally emphasise contingency and sociological detail there has been a tendency for many studies to avoid broad theoretical generalisations and normative and policy recommendations (this has recently become a contentious issue across SSK more generally; for an overview see Ashmore & Richards 1996). Some common observations and themes can nevertheless still be identified across SSK/law studies:

First, it may be possible to identify possible patterns in persistent social structures / institutions and relationships informing law-science intersections.

Second; and the most important source for the generalisations I will discuss below; is the persistence of the use by many participants in law-science encounters of naive/realist positivist images of science. Such images are frequently used by participants and commentators to frame their arguments and provide conceptual resources to legitimate or critique actions.

Following from the points above, some common themes and observations can be identified: these themes can be described under the following rubrics:

- . resilience of appeals to naive realist/positivist epistemology;
- . parallels between professional ("boundary-working") rhetorics of 'legalism' and 'scientism';
- . legal deconstruction of science;
- . method discourses/ legal re-constructions of science;
- . law/science hybrids; and
- . reified images of interactions of science and law as surrogates for wider political visions.

### **Resilience of appeals to naive realist/positivist epistemology**

Despite claims made by popular commentators, such as Huber (1991) and Levitt (1999) that there has been a recent growth in anti-science sentiments in public, academic (humanities) and legal/regulatory cultures (for a critical overview see Mercer 1999), most SSK-orientated studies have suggested that appeals to naive realist and positivist images of science are still extremely resilient in legal settings; two examples: *The Daubert 'Revolution'* and *Citations of SSK in legal discourse*, are provided below.

*The Daubert 'Revolution'*: In 1993 the US Supreme Court in *Daubert v Merrell Dow Pharmaceuticals* embarked upon what has been described as a 'revolutionary' shift in the admission of scientific expert opinion evidence. Daubert's interpretation of the US *Federal Rules of Evidence* 1975 replaced the so called *Frye* 'general acceptance' test for the admissibility of scientific evidence. 'General acceptance' came to mean that for admission, novel expert opinion evidence should conform to methods, principles and conclusions which had received widespread 'acceptance' in particular 'fields'. The *Daubert* judgment produced 'new' criteria for the admissibility of scientific evidence. It provided four flexible and non-exhaustive indicia for judges to have regard to when assessing the reliability and therefore the admissibility of purportedly scientific evidence. Indicia to be used in assessing science included: whether the claims can and have been tested (falsificationism); whether the theory or technique has been subjected to peer review and publication; the known or potential rate of error; and, whether there has been 'general acceptance' of the 'claim' within a relevant scientific community.

Most commentators, including the US Supreme Court majority, emphasised the importance and

primacy of Sir Karl Popper's doctrine of testability/falsification in distinguishing science from other forms of inquiry:

Ordinarily, a key question to be answered in determining whether a theory or technique is scientific knowledge that will assist the trier of fact will be whether it can be (and has been) tested. "Scientific methodology today is based on generating hypotheses and testing them to see if they can be falsified; indeed, this methodology is what distinguishes science from other fields of human inquiry." Green, at 645. See also C. Hempel, *Philosophy of Natural Science* 49 (1966) ("The statements constituting a scientific explanation must be capable of empirical test"); K. Popper, *Conjectures and Refutations: The Growth of Scientific Knowledge* 37 (5th ed. 1989) ("The criterion of the scientific status of a theory is its falsifiability, or refutability, or testability") (*Daubert v Merrell Dow Pharmaceuticals, Inc* at 1317).

The *Daubert* court's emphasis on Popper raised numerous difficult questions, for example: How representative is falsification of the philosophy of science? Is Popper's doctrine sufficiently consistent to be effectively put to use? Do scientists actually use a universal scientific method to start with: let alone falsification? Do judges comprehend what Popperian falsification entails? In fact the latter point was raised in the minority *Daubert* judgment by Rehnquist CJ at 4811 (Edmond & Mercer 1997a, Edmond 2000b, Schwartz 1997). Despite these difficulties the *Daubert* court's use of Popper, whilst subject to modification and elaboration in later proceedings (*Joiner* and *Kumho*) has been well received. Many commentators have celebrated *Daubert* as an important symbolic marker for the victory for the use of realist views of the philosophy of science in law and conservative politics in limiting the scope of courts to hear novel or controversial scientific claims (Foster & Huber 1997, Edmond & Mercer 1999b, 2002b).

*Citations of SSK in legal discourse: A study of citations of the history, philosophy and sociology of science in US Federal courts between 1940 and 2001* (Edmond & Mercer 2002b) noted that US Federal courts were largely unresponsive to currents of thought in 'science studies' over that time. It was only when the issue of the admissibility of scientific evidence became a more public matter with a few notable creation science cases (Geiryn, Bevans & Zehr 1985) and then *Daubert*, that science studies literature was drawn upon, with judges revealing a preference for citing Popper as an authority for more restrictive rules for the admissibility of expert evidence. The few SSK citations that appeared from time to time, and there were very few, were often used as authorities for mundane propositions significantly displaced from the general body of SSK thought.

A good example of the above appears in the dissenting judgment of Judge Jacobs in a copyright infringement case *American Geophysical Union v Texaco Inc* (1994). Jacobs supported the proposition that the photocopying of scientific articles was an important and legitimate part of scientific research practice. As authority for this extremely theoretically banal proposition, he cited Latour and Woolgar's well known text, *Laboratory Life* (1979):

The anthropologist Bruno Latour spent two years studying scientists at the Salk Institute for Biological Sciences. During the course of his study, he conducted anthropological observations of a neurobiologist working on an article for a journal. This scientist's desk was littered with copies of journal articles authored by other scientists (cited in Edmond & Mercer 2002b: 335).

In another literature survey (Edmond & Mercer 1998a), this time tracing the way eminent SSK law science commentator Sheila Jasanoff's work has been put to use in post-*Daubert* Anglophone secondary legal literature, it was noted that whilst Jasanoff was sometimes cited, it was not necessarily for the SSK insights one would expect. A representative example of such re-appropriation can be drawn from a discussion in the journal *Judicature* by Miller, Rein and Bailey (1994). This article focused on the questions surrounding the need to improve judicial scientific literacy, According to Miller et al, the 'sociology of science', represented by Jasanoff's 'What Judges Should Know About the Sociology of Science' (1992), demanded that judges be conversant with 'the scientific method':

At a minimum, judges will have to become conversant with the "sociology of science," with emphasis on such concepts as "the scientific method" to understand at least the rudiments of statistics and probability theory; to obtain some appreciation of error factors and the implicit limitations of oft-used means of scientific observations, measurement, and detection; and to become familiar with the Federal Judicial Center's forthcoming reference guides intended to

provide the basis for intelligent judicial inquiry of proffered experts in fields such as epidemiology of toxicology (Miller, Rein & Bailey 1994: 254).

Miller, Rein and Bailey appeared to be unaware of the syncretism of placing SSK, represented by Jasanoff's writings, which proceed from the general assumption that there is no universal scientific method, alongside the need for judges to be conversant with 'the scientific method'!

The apparent difficulty in so much legal discourse to break out of a simple empiricist/rationalist frame is also exemplified by the way so many policy innovations in common law legal systems are predicated on the idea that there is ultimately a straightforward boundary that can be drawn around science and law to stop the distortion of scientific facts (Edmond & Mercer 1998b). Examples include the use of science courts, expert panels, court-appointed experts. Much of the debate about junk science which I will discuss in more depth at a later point also relies on the possibility of simple demarcations between good and bad science. One set of explanations for the resilience of appeals to naive realist epistemology in law-science interactions has been that both areas of activity share parallels in the way their professional rhetorics of legalism and scientism appeal to the possibility of objective decision-making to maintain their social legitimacy. I will explore this theme below.

### **Parallels between professional ('boundary-working') rhetorics of 'legalism' and 'scientism'**

A repeated theme in SSK and law discourse has been the exploration of the implications of the similarities between the professional 'boundary working' rhetorics (Geiryn 1999) of lawyers and scientists, especially in their use of images of rationality and empiricism. Brian Wynne (1982) has developed this theme to critique the various ways 'idealised' artificial images of legal and scientific rationality foreclose a better understanding of law-science relationships. He proposes that one of the reasons the practical reasoning, uncertainties and more craft-based aspects of science are not openly acknowledged in legal contexts is that legal systems boost their own social authority by nurturing a self-image of legal practice similar to the idealised image of science. The ideal self-images of legal thought and practice emphasise the possibility that the legal system can transcend political and personal biases to ensure the optimal rational outcomes in conflict resolution, given the constraints of formal law, via the objective discovery of facts and impersonal application of rules. This image has notable similarities to that of defining science according to its possession of ideal behavioural 'norms' and the application of a universal objective scientific method (Mulkay 1979). Recognition that legal forms of knowledge and assessment, like science, rely on various tacit and contingent judgments could weaken legal claims for social authority. It is, in a sense, structurally difficult for each body of practice/discourse to acknowledge the more localised features relevant to the framing and negotiation of both scientific and legal knowledge. The tensions involved in maintaining scientific and legalistic images, in practice, is one of the factors that has led a number of SSK writers to consider the issue of the so called legal 'deconstruction' of science.

### **Legal 'deconstruction' of science**

Many SSK studies have noted the way the slippage between ideal images of science and the messy realities of scientific practice provide a particularly fertile source for the legal 'deconstruction' of science -- especially in adversarial settings (Smith & Wynne 1989, Fuchs & Ward 1994, Lynch 1998). In such contexts, the work of scientists and their knowledge claims can be measured against standards of conduct and proof provided by ideal images of scientific norms and method. By juxtaposing these idealised images against revelations of the inevitably more craft-based nature of scientific work, as well as the socially contingent status of scientific knowledge claims, an interpretative space is created for the deconstruction of scientific authority: 'Scientists are constantly at risk of being hoist by their own positivist petard' (Jones 1994).

A widely quoted example of these processes can be found in the work of Oteri, Weinberg and Pinales (1982) on the cross-examination of chemists in drug cases. Oteri et al outline a number of ways the expert's authority can be thrown into doubt. They note that the lawyer may: challenge whether or not the qualifications of the chemist neatly match the practical issue at stake; highlight the variations between the methods used in various drug tests; or introduce evidence whether the chemist relied on hearsay from other researchers rather than personally testing the specific substance at hand. Furthermore, some tests may be performed which have a strong empirical background but an absence of deeper theoretical basis for the underlying processes involved. Such tests may be widely accepted

by convention, even though they rely on numerous taken-for-granted assumptions. Additional considerations might be that the tests are not the most accurate, but rather have been chosen because they are cheaper, quicker, or easier to perform.

Some SSK writers have focused on 'legal deconstruction' as offering possibilities to make both law and science more publicly transparent. Jasanoff describes this as 'civic education' (1995). The implicit value orientations and social processes involved in the construction of science and expertise become more transparent as actual expert practices and knowledge claims are held up against unobtainable ideals of such practices in public fora.

Whilst specific scientific claims are being deconstructed in such settings, these processes may not necessarily involve a deconstruction of expertise and science more generally. Legal and regulatory settings nearly always rely on an ultimate reconstruction of 'the science' rather than a non-scientific justification for a conclusion (see discussion above). This means legal deconstruction can be 'one sided', specific, or, to use SSK jargon, 'asymmetrical'. It is not science in general, or expertise, being exposed but a specific body of knowledge, or individual, being exposed as lacking in a specific context. Many actual case studies of legal deconstruction show the intricacy of these processes. A good example is the controversy over DNA typing in the OJ Simpson trial (Jasanoff 1995, Lynch & Jasanoff 1998). Because of an absence of standards and protocols, DNA typing, in the first instance, appeared vulnerable to 'deconstruction', but this *deconstruction* was followed by an ultimate *reconstruction* of DNA typing. This occurred through efforts by scientific authorities external to courts to encourage legal standardisation to overcome 'legal deconstruction'. This showed how 'legal deconstruction' might play a role in the actual construction of scientific knowledge, and the learning processes of institutions. Whilst 'legal deconstruction' may enhance the public accountability of institutions creating and using scientific knowledge the OJ Simpson example suggests that these processes may, at best, be rather indirect (Edmond & Mercer 1996, Edmond 1998). The important ways in which legal pressures can merge with the processes of constructing and reconstructing science is the next theme I will discuss.

### **Method discourses/ legal re-constructions of science**

The tendency in Anglophone contexts for law-science knowledge-making in 'toxic torts' and public health inquiries to deliberate on causation in the specific, as well as define what counts as evidence for causation more generally, makes those deliberations an exercise in decision-making extending beyond specific pieces of scientific knowledge to include the negotiation of tacit but transferable models of science and the scientific method (Edmond & Mercer 2000, Mercer 2002). Law/science encounters become fruitful sites for the operation of folk and practical epistemologies of science, or what could be described as 'scientific method discourses' (Schuster & Yeo 1986, Richards 1991). These models of science help 'stabilise' and aid the circulation of particular sets of knowledge claims in response to shifting social landscapes and opposing arguments.

This can involve the construction of very general models of scientific method such as in *Daubert* (above) and also more specific and intricate stipulations of what should count as appropriate scientific standards. This capacity for law/science encounters to, in a sense, generate scientific knowledge and standards for what should count as science, is well illustrated by the history of the litigation involving the alleged hazards of the morning sickness medication Bendectin. The following discussion is based on Edmond and Mercer (2000).

The Bendectin litigation involved the allegation that ingestion of the anti-nausea (anti-morning sickness) drug Bendectin in the first trimester of pregnancy led to birth defects. After a number of years of litigation the matter was effectively closed by the emergence of what could be described as the 'favor epidemiology rule': the privileging of published epidemiological studies over other forms of scientific evidence to determine whether or not Bendectin 'caused' birth defects. During the course of the Bendectin litigation, a range of courts came to different conclusions and administered trials and appeals according to their evaluations of the behaviour, credibility and conclusions of individuals, disciplines and institutions. Judges explained their findings according to various interpretations of legal standards, scientific standards, and in some cases the broader social implications of the litigation. Drawing on Bendectin cases from 1983 to 1992, it is possible to gain an indication of how the evidentiary domain shifted and a Bendectin 'scientific method discourse' favouring particular types of epidemiology prevailed. The defendants relied predominantly upon published epidemiological evidence and once Bendectin had been withdrawn from sale, 'secular trend data' to ascertain if there were any differences

in the net number of birth defects. By contrast, plaintiffs based their cases upon re-analysis or meta-analysis using one or more of the published epidemiological studies or emphasised non-epidemiological evidence, particularly in vivo, in vitro and chemical structure comparisons between Bendectin and teratogenic substances. Judges presiding over the earlier and relatively isolated Bendectin trials tended to admit a broad range of evidence. As the litigation escalated and cases were appealed, federal appellate courts began to restrict the types of evidence deemed admissible or sufficient to sustain the plaintiffs' allegations. Included in this more restrictive atmosphere were attempts to exclude all but the results of original published epidemiological studies ('favor epidemiology rule'). Over time most of the appellate courts drawing on the authority of the evolving 'informal' 'favor epidemiology rule' determined that the plaintiffs' evidence was legally insufficient to prove that Merrell had caused their injuries specifically or was responsible for such injuries more generally. The deliberations of individual 'Bendectin courts' involved not only the consideration of specific pieces of scientific evidence but also considerations from past legal proceedings (such as the *Agent Orange* litigation and earlier Bendectin cases) and were undertaken in anticipation of future policy and jurisprudential implications of the so-called 'litigation explosion,' 'insurance crisis,' 'junk science'; the seminal US Supreme Court *Daubert* decision (see above) on the admissibility of scientific evidence; and, concerns about the efficient use of 'scarce' judicial resources.

Setting informal legal/scientific precedents to give greater credit to certain types of evidence can also involve de-facto decisions about what types of institutions are to be taken more seriously in decision-making about science and technology. Wynne (1982) has noted some of these types of dynamics at play in his case study of the politics of decision-making involving nuclear power in Britain's *Windscale Inquiry*. During the Inquiry, environmental groups frequently raised questions about future energy policies but experienced difficulties in having these arguments considered by the commissioner who gave preference to more quantifiable styles of evidence such as 'scientific risk estimates' which were a more familiar part of the nuclear industry advocates' techno-cratic vocabulary.

### **Law/Science Hybrids**

If the social/epistemic dynamics of law-science intersections can be seen to encourage the development of scientific method discourses which are in a sense hybrid entities meshing legal and political and scientific concerns, it follows that various forms of expertise are likely to emerge which also display hybrid identities. Examples of such law/science hybrids include forensic science, patent law, environmental regulation, and insanity laws. With increasing demands on governments to formulate authoritative public policy, certain branches of science and law have evolved together in close relationships. This integration of science and law often operates more deeply than merely the specific settings of given legal proceedings. In fact the very constitution of some types of scientific knowledge can be shown to be shaped by the demands of legal/quasi-legal settings. Smith and Wynne (1989) note that this integration appears at its most obvious when we consider fields of knowledge such as forensic pathology:

It is not only the court room interaction that socially shapes knowledges: the institutional integration of a particular expert profession into the legal process already achieves this. Indeed, for forensic science and pathology, the legal process itself has created their particular type of professional interaction and expert knowledge. The social integration of forensic expertise with the law is such that forensic experts have learnt to reconcile themselves to the regular adversarial skepticism of legal processes, while maintaining the normal consensual discourses of scientific expertise. Whereas other disciplines may manage this by defining the court-room [sic] interaction as "unscientific," this is not so easily available to forensic experts, because the courtroom is their ultimate professional arena (Smith & Wynne 1989: 15).

The development of 'hybrids' reinforces the contention that understanding law-science interactions requires a finely grained empirical concern for the intricate ways science and law are brought together. It is far too easy to claim that hybrids are inadequate on the basis of exposing their genesis in social, economic, or technical needs, and comparing this to artificial, ideal images of science as an activity totally insulated from social contexts.

### **Reified images of interactions of science and law as surrogates for wider political visions**



One of the most important and persistent themes in scholarship which has investigated law/science encounters has been the notion that social pressures surrounding litigation have led to the development of 'junk science' (junk science supposedly being the science generated for the purposes of litigation but with little resemblance to 'real' scientific knowledge). As noted above, 'junk science' has been identified by some commentators as residing at the centre of a broader 'social problem' involving a litigation explosion, insurance crisis, and public paranoia in relation to environmental damage and health risks (Huber 1991). It is suggested that without legal-political pressures the scientific community would be able to 'weed out' deviant junk science claims (Foster & Huber 1997, Edmond & Mercer 1999a). Images of the problem of junk science have underpinned initiatives to limit the role of lay juries, institute expert panels and enact stricter requirements for the admissibility of scientific and expert evidence to courts (Edmond & Mercer 1997a).

The difficulty in actually defining simple legal rules for demarcating real science from junk science, and plausibly dismissing numerous scientific controversies and popular concerns with new science and technology as merely 'junk science'-led paranoia, has been difficult to convert into sustainable policies. Implementing simple demarcation criteria between science and non-science have proved more difficult in practice than advocates have anticipated (Jasanoff 1995, Edmond & Mercer 1998a, 1998b, Edmond 2000a).

Whilst debates about 'junk science' have focused on demands to reform the legal system, much of the debate would appear to be a surrogate for broader concerns which intersect with, but do not have their origins in, the legal system. This includes concerns with such things as political control over technological decision-making and questions of institutional responsibility for, and public acceptability of risks related to new technologies (Wynne 1982, Jasanoff 1995, Edmond & Mercer 1998b).

In a recent commentary on Silicon Gel Breast implant litigation, Jasanoff (2002) has noted what she believes is a shift in the way US courts view their role and also the status of 'victims'. Drawing on Scott's (1998) metaphor of 'seeing like a state' she suggests that courts may increasingly be 'seeing' victims in tort litigation not as individuals whose claims should be assessed piecemeal by the individual scientific expert, but as statistical victims, whose claims are best assessed by a 'legally constructed' vision of mainstream consensual science. Jasanoff suggests this represents a significant shift towards a more technocratic/bureaucratic ethos in the US legal system.

### **Concluding Comments: Reframing Policy?**

As noted at the beginning of this paper, the tendency for SSK-orientated studies to focus on the particulars of the interactions between law and science, and because of their agnosticism in drawing upon epistemic definitions of law and science, there has been a tendency for SSK-orientated studies to avoid making broad normative claims or broad policy recommendations. Following this framework, SSK's main contribution to understanding the intersections of law and science has been its eye for empirical detail in relation to the particular ways knowledge is socially constructed when law and science are brought together. This nevertheless only captures part of SSK's possible contribution to policy. I have constructed below a thumbnail sketch of a sample of some of the important policy-orientated questions which have been raised by SSK approaches:

- . Can current popular policy approaches to problematic law science intersections that emphasise epistemological quick fixes, such as *Daubert*; expert panels, science courts etc, be successfully applied to the more complex social and epistemic law science relationships (exposed by SSK) of professional boundary work and hybrid expertise and institutions?
- . Can ways of legitimating legal decisions and setting criteria for the admissibility of expert evidence to courts be developed without relying on simplistic positivist epistemology?
- . How do the ways that science is both 'deconstructed' and 'reconstructed' in legal settings influence the broader public understandings of law and science?
- . How do legal and regulatory processes shape the development of various sciences and scientific method discourses and shape the development of particular styles of expertise and institutions?

. How do simplistic links between images of 'junk science' (legal distortion of science) and social and political problems disguise broader political debates about control of new science and technology and disagreements over responsibility and acceptability of technological risks?

Many more traditional approaches to the intersections of law and science would be unlikely to investigate the types of questions set out above. Whilst they often commence with what appear to be pragmatically grounded agendas for reform, their persistent appeal to simplistic epistemologies of science means they become easily distracted and drawn into endlessly recursive exercises of defining the essences of science and law. By investigating the intersections of law and science, whilst avoiding simplistic epistemologies of law and science, SSK offers a way of avoiding the traps of such normative scholasticism.

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## Footnotes

1 Sections of this paper are based on presentations given to 'Workshop on Critical Issues in Science and Technology' at the Institute of Advanced Studies on Science Technology and Society in Graz, Austria 7 June 2001 (reproduced in Bamme' A, G Getzinger and B Wieser eds 2002 2002 Yearbook of the Institute for Advanced Studies on Science Technology and Society' Profil Verlag Munchen 255-72); 'Seminar Series' Australian Centre for Intellectual Property in Agriculture at the Australian National University 26 July 2001 and 'Work in Progress Seminar Series' Legal Intersections Research Centre Faculty of Law University of Wollongong 27 May 2002. Thanks to Guenter Getzinger, Bernhard Wieser, Mathew Rimmer, Rick Mohr and Luke McNamara for organising these seminars and their feedback more generally. Special thanks to Gary Edmond for his collaboration on many of the papers discussed within and numerous fruitful discussions on law and science.

There are a growing number of SSK and Law case studies: a sample of studies and topics includes:

\* Nuclear power (Wynne 1982)

\* 'Insanity laws' (Smith 1985)

\* 'Toxic torts' (Edmond & Mercer 1997a, 1998b, 2000, 2002a, Jasanoff 1995, 1998, 2002)

\* 'Creation science' (Geiryn, Bevins & Zehr 1985, Edmond & Mercer 1999a)

\* Juries (Edmond & Mercer 1997b)

\* Rules for admissibility of expert evidence (Jasanoff 1995, Solomon & Hacket 1996, Edmond & Mercer 1997a, 1999b, 2002b)

\* Forensic science (Smith 1988, 1989, Edmond 1998, 2000b, 2001, Lynch & Jasanoff 1998, Cole 2001)

\* Environmental inquiries (Yearley 1989)

\* Patent laws (Cambrosio, Keating & Mckenzie 1990)

\* Legal and regulatory culture(s) more generally (Nichols 1979, Smith & Wynne 1989, Jasanoff 1987, 1995, 2002, Golan 1999). SSK approaches also overlap with various areas of critical legal studies and studies of law, rhetoric and cultural studies of science which share SSK's post-Kuhnian scepticism towards positivist meta-narratives of science (Caudill 2002). It is beyond the scope of this current brief overview to review these other areas of study.