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Human(e) Science? Demarcation, Law, and 'Scientific Whaling' in *Whaling in the Antarctic*

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Abstract
This paper analyzes a recent case in which a court, like the *Daubert* Court, was asked to demarcate legitimate from illegitimate science. The court was the International Court of Justice (ICJ), and it was asked by the state of Australia to find the state of Japan in violation of the International Convention for the Regulation of Whaling because of its licensing of a research program that engaged in killing whales ostensibly "for purposes of scientific research." Australia premised a good portion of its argument on a four-part definition of "scientific research," reminiscent of the four notorious "*Daubert* criteria," and the claim that the Japanese research program, "JARPA II," failed to comply with this definition. The paper suggests that the Court's judgment, which forced Japan to temporarily cease whaling, illustrates the merits for courts of avoiding the temptation to engage in demarcation exercises.

Introduction
It has been more than 20 years since the U.S. Supreme Court's landmark decision in *Daubert v. Merrell Dow Pharmaceuticals* about the admissibility of expert witness testimony. *Daubert* is of interest to philosophers and historians of science because of its directive to American judges to engage in demarcation, to distinguish legally admissible from inadmissible science, which is in some ways coterminous with "legitimate" and "illegitimate" science. The Court's implicit philosophy of science has been widely discussed, and almost as widely critiqued, as muddled, misguided, or as "junk *philosophy* of science" (Caudill and Redding 2000; see also, e.g., Schwartz 1997; Edmond and Mercer 2002; Haack 2005). In addition to being widely characterized as the most important scientific evidence case in the U.S., *Daubert* has been widely discussed abroad, with some observers and official bodies calling for the adoption of *Daubert*-like approaches to scientific evidence (Edmond and Roach 2011).

In this article, we discuss a recent case in which a court, like the *Daubert* Court, was asked to endorse a set of guidelines for distinguishing legitimate from illegitimate

scientific practice. The case is *Whaling in the Antarctic (Australia v. Japan: New Zealand Intervening)*, and it was decided in 2014 by the International Court of Justice (ICJ), the judicial arm of the United Nations which hears disputes between sovereign states. Australia, with the subsequent intervening support of New Zealand, claimed that Japan was violating the International Convention for the Regulation of Whaling by killing whales for an ongoing scientific research program called "JARPA II." Under JARPA II, Japan took 3283 whales between 2005-2011, averaging 544 minke whales per season and 19 fin whales in total (*Whaling in the Antarctic* 2014, ¶130). According to the IWC, the "best estimate" of minke whales in the Southern Hemisphere alone is about 515,000, and the total population of fin whales is estimated at about 100,000 (International Whaling Commission 2014b). Although Article VIII of the Convention allows signatories to take whales "for purposes of scientific research" (ICW 1946, 2), Australia claimed that Japan's whale research program did not constitute legitimate scientific research. Thus, to some extent the case hinged upon the Court's definition of "science."

In March 2014, by a vote of 12-4 (on most issues), the Court ruled that JARPA II did indeed violate the Convention. Thus, Japan immediately curtailed JARPA II and ceased taking whales, although they have already proposed a new whaling program to commence "by the autumn this year" (Fisheries Agency 2014).

Legal cases over whales, charismatic megafauna which have long loomed large in the symbolic lives of many human cultures (Oslund 2004), are of inherent interest. Burnett (2007), for example, offers a fascinating account of *Maurice v. Judd,* an 1818 New York case on the issue of whether whales were fish, in which contested conceptions of scientific knowledge and the "relevant scientific community" were also very much at stake. That case itself evokes a recent U.S. Supreme Court case that posed the curious question, in the words of Chief Justice Roberts, "Is a fish a record, document or tangible object?" (Liptak 2014; *Yates v. United States* 2015). In addition to the inherent interest of this case for the ongoing saga of "whale politics" (Heazle 2006), the case is of interest in revealing the encounter by a different court with the same demarcation problem faced by the *Daubert* Court. It is also of interest in light of increasing calls to internationalize *Daubert* (Edmond and Roach 2011).

In many ways, however, the case has more in common with a different set of American cases in which demarcation was at stake: the cases over the teaching of, first, "scientific creationism" and then "intelligent design" (Ruse 1982b; *Kitzmiller v. Dover Area School District, et al.* 2005). In those cases, the plaintiffs alleged that the purported "science" was, in fact, a mere façade—that the promoters' true motivations were religious. Philosophers of science testified about the demarcation problem in both cases, and in both cases their testimony was questioned by their colleagues outside of court (e.g., Laudan 1982; Ruse 1982a, 1982b; Laudan 1983; Cole 2006; Edmond and Mercer 2006; Fuller 2006; Gorman 2006; Lambert 2006; Lynch 2006; Pennock 2011). In *Whaling in the Antarctic,* Australia's claim, similarly, is that "science" is "merely a guise" (*Whaling in the Antarctic* 2014, ¶130)—that the true motivation is the procurement and sale of whale meat in order to preserve Japan's "whale eating culture" and perhaps to

resist the imposition of Western values (Blok 2010, 66). As one commentator noted about “the practice of so-called scientific whaling...It is, of course, widely accepted that the practice is intended to keep a small whaling enterprise alive” (Stoett 2005, 169).

Background

In 1946, the International Whaling Commission (IWC) was created through the signing of the International Convention for the Regulation of Whaling, in order “to provide for the proper conservation of whale stocks and thus make possible the orderly development of the whaling industry” (IWC 1946, 1). While initially the purpose of the IWC was to prevent overfishing, in 1982, consistent with widespread anti-whaling sentiment around the world, it issued a moratorium on all commercial whaling. However, there are exceptions: whaling by indigenous groups, killing of “small whale” species,[1] Norway’s commercial whaling program, which is conducted under auspices of its formal objection to the moratorium, and whaling “for purposes of scientific research,” as allowed by Article VIII of the Convention, by Japan and Iceland (Oslund 2004, 72).

The IWC has a permanent Scientific Committee composed of more than 120 scientists (Aron, Burke, and Freeman 2002, 1138), but the production of scientific knowledge in the Committee has always been difficult and suffused with politics (Burnett 2012, 406-7). It has been observed that “real-world ‘cetapolitics’ in and around the IWC is a power-game of economic sanctions, vote buying, and verbal confrontation” as well as “more coercive measures” (Stoett 2005, 171; Blok 2010, 70). Membership in the IWC is open to all countries, and there have been persistent allegations that Japan “buys” votes from poor countries with foreign aid (Dippel 2015). There are reports of the Scientific Committee voting on scientific results and of resignations in protest (Stoett 2005, 169; Blok 2010, 60-1).

In 2010, Australia initiated *Whaling in the Antarctic* before the ICJ, as recommended by the Antarctic Treaty when a dispute cannot be resolved via “negotiation, inquiry, mediation, conciliation, arbitration, judicial settlement, or other peaceful means” (Conference on Antarctica 1959, Art. XI).

The ICJ evolved from the Permanent Court of International Justice, which had been formed in 1922 through the League of Nations. The Court entertains two types of cases: those between two or more states and requests for advisory opinions. Proceedings can be submitted via bilateral agreement or, such as in the case of *Whaling in the Antarctic,* a unilateral application from an applicant State against a respondent State. Contested cases include a written phase and an oral phase. There are no provisions to appeal an ICJ judgment. The Court is composed of fifteen judges plus a President elected to nine year terms by the Security Council and General Assembly of the United Nations. By informal convention, seats on the court are allotted to the five Security Council members and then to specific regions. The judges tend to be jurists with distinguished records in their home countries (Golden 1978-1979).

Whaling has been hotly—and emotionally—contested for decades. In the decades leading up to the 1960s, Western publics shifted from perceiving whales as sources of

food and industrial products into perceiving them as intelligent life forms, capable of communication, a shift that ultimately resulted in the 1982 moratorium (Burnett 2012, 627-28 & 658). As public opinion shifted away from whaling and the meat and oil obtained from whales lost economic value, the burden of proof shifted to whalers to show that the magnitude of their "take" was not damaging stocks or ocean ecosystems (Heazle 2006). In subsequent decades, the anti-whaling rationale shifted as well: from "the endangered whale," a species population to be managed in order to prevent extinction, to "the rights-bearing whale" (Blok 2010, 65). In the latter discourse, whales are not just any endangered species, but special because of their intelligence and sociality. "To groups supportive of such 'ethical' standards, whaling conflicts are recast in terms of the unacceptable suffering of individual whales" (Blok 2010, 61; see also Oslund 2004, 76). Meanwhile, "Certain places of the globe—Japan, Iceland, and Norway—have reshaped themselves (and been reshaped) into the transnational identity category of 'whaling nations'" (Blok 2010, 57). Whaling has become the "most protracted of global biodiversity conflicts" (Blok 2010, 56). "Whales, in short, have become publicly controversial matters-of-concern, embroiled in an antagonistic 'cosmopolitics'" (Blok 2010, 62), and "the level of antagonism borders on a war-like situation" (Blok 2010, 63).

Australia's Case

Australia contended that "JARPA II, like JARPA before it, is 'merely a guise' under which to continue commercial whaling" (*Whaling in the Antarctic* 2014, ¶130). But how could Australia prove that the science in JARPA II was a pretense? In order to make their cases, both Australia and Japan relied heavily on the testimony of scientific experts. We focus here on the two expert witnesses who most directly addressed the demarcation problem.

On May 9th 2011, Australia submitted a Memorial—what in U.S. law would be called a "Brief"—making its main arguments against Japanese whaling and the scientific value of JARPA II. Within the Appendix of this document, Marc Mangel, an American mathematical biologist from the University of California, Santa Cruz, used ten pages to define the "Characteristics of a Program for Purposes of Scientific Research." Using this definition, he provided a critique of JARPA II and concluded that it was not "a program for the purposes of scientific research" (*Statement of Mr. Marc Mangel* 2013, ¶6.9).

The use of either a practicing scientist or a philosopher of science to characterize the nature of science, is common in such cases, as, for example, in *Dover*, discussed above. While many assume intuitively that practicing scientists are the most expert about the nature of science, some philosophers quipped—pertinently—that practicing scientists know no more about the nature of science than fish do about hydrodynamics and that it is, therefore, to philosophers that one should turn with questions about the production of scientific knowledge (Lakatos 1970, 148). Australia chose a practicing scientist, a choice with interesting implications that we shall now discuss.

Mangel argued that a scientific research program must have four attributes: (i) a hypothesis in the form of an "over-arching conceptual framework that leads to a set of

focused questions"; (ii) the correct set of empirical tools to answer the questions posed, including sound statistical reasoning and appropriate mathematical models and data; (iii) assessment by the scientific community; and (iv) it should be designed to avoid negative unintended environmental consequences (¶4.8). These four criteria are the basis for much of Australia's case. Throughout their Memorial, they reiterate Mangel's criteria in order to show that JARPA II does not satisfy it.

Mangel concluded that JARPA II does not fit within his parameters. It failed to have an overarching conceptual framework because "it is difficult to impossible to clearly identify the hypotheses" and its "stated objectives could be used to justify almost any activity that Japan wished to pursue" (¶5.22). Rather than beginning with a research question, JARPA II began with the idea that lethal takes were necessary for gathering data. It also failed his second requirement. The justification for its sample sizes was not clear, its ecosystem models were not attainable with the data that it collected through lethal takes, and much of its data could have been obtained through non-lethal methods, thus showing it did not utilize appropriate tools (¶5.51). Third, only 15% of the papers produced by JARPA II appeared in peer-review journals, and "workers" (Mangel does not use the word "scientists") within the program were unwilling to respond to criticism or even have their proposals reviewed. Finally, JARPA II did not consider negative consequences that it could have on minke whale stocks or other indirect effects on ecosystems. According to Mangel, a "well-designed program of research would recognize these possibilities and check for them, even if the likelihood of an adverse effect on the overall population were small" (¶ 5.67).

Mangel's four-part test for determining whether an activity is science evoked the four-part (or five-part, nine-part, three-part, or two-part)[2] test in *Daubert.* But Mangel's test differed from *Daubert's.* Two factors (hypothesis testing and peer review) overlap with the *Daubert* criteria, and two appear to be of Mangel's own invention. Indeed, Australia cites *Daubert* as authority in support of the peer review factor (*Whaling in the Antarctic* 2014, ¶4.108). The fourth factor, "lack of environmental harm," seems the most obviously questionable, as well as the most obviously devised for Mangel's particular purpose in this particular case. As a solution to the demarcation problem, philosophers of science would find Mangel's four-part test as wanting as *Daubert's* (Haack 2005).

Table 1. Comparison of criteria for science in *Daubert v. Merrell Dow* and the Australian Brief in *Whaling in the Antarctic.*

	Daubert	Australia
1	Falsifiability	Hypothesis testing
2	Peer review & publication	Appropriate tools
3	Error rate and standards	Peer review
4	General acceptance	Lack of environmental harm

Rebuttal

In April 2013, Lars Walløe, a physiologist at the University of Oslo, submitted written expert testimony to the ICJ. The use of a Norwegian expert witness in the defense of Japanese scientific whaling, can, of course be seen as sign of solidarity between ostracized "whaling nations" (Mageli 2006, 130). While Norway did not officially intervene in the case, it seems to be no accident that Japan's expert witness was Norwegian.[3] Walløe critiqued Mangel's definition of science for being far too simplistic and rigid and concluded that the research and methods conducted by JARPA II did fit within scientific norms.

Walløe begins his rebuttal by stating that one of the purposes of his testimony is to contradict the "restrictive and therefore misleading general understanding of the concepts 'scientific research' and 'scientific methods,'" including the "claim that Japanese scientists have not determined the necessary sample size by 'established' statistical methods" (*Statement of Mr. Lars Walløe* 2013, ¶2). Walløe also comments on the claim that similar data could be derived from non-lethal tools and methods. In order to provide structure to his argument, Walløe begins each section of his testimony by quoting from Mangel's report, and then provides alternative propositions.

In many ways, Walløe had the easier task. Rather than trying to devise a definition of science, he simply needed to show ways that science widely considered legitimate could be conducted outside of Mangel's definition. Beginning with Mangel's four part criteria for a scientific research program, Walløe calls it an adequate, if idealistic and simplified, description of research in a fairly advanced biological field where there are already accepted frameworks about the main systems under investigation. However, he counters, most biological and ecological disciplines are not in such an advanced stage of study. This is especially true in the Southern Ocean, where knowledge is very limited. In this situation, he claims, "all physical, chemical and biological oceanographic data that can be collected may be considered potentially valuable, not only data relevant to specific hypotheses" (¶10).

While there usually are general hypotheses behind data collection, these are often vague and difficult to formulate in scientific language. Walløe offers examples from the history of biology where scientists collected data with no clear hypothesis. A particularly famous example from the 19th century is Gregor Mendel's laws of inheritance. While these eventually became the foundation for the field of genetics, Mendel did not begin his work with a clearly defined hypothesis. Rather, he tried and failed to find patterns of inheritance with mice and bees. Then, once he began his work on pea plants, he first studied thirty-four varieties of peas, before narrowing his research to twenty-two. Only in his final years did he look at seven traits in detail. Most of his time was spent making observations and trying to identify patterns. It was not until very late in his work that he formulated a clear hypothesis. Additionally, Walløe adds, in some of his own research in which a government research program in Norway was attempting to discover causes for fish depletion, scientists collected a vast amount of data from acid rain, searching for a possible unknown factor. Because they eventually found a toxic component from these random analyses, this "clearly shows that a random search within a large set of possible

chemical and physical variables…may yield important results without a specific hypothesis as the starting point" (¶14). Finally, the emerging practice of data mining through powerful computer programs can make the gathering of vast amounts of data more useful. In a way, Walløe's position reflects the now notorious claim that "big data" would render scientific theories and the testing of them "obsolete" (Anderson 2008).

In response to Mangel's stress on sample sizes, Walløe argued that while Japanese scientists were not always transparent on how they determined their sample sizes, he believes that yields of about 800/year, which are standard for JARPA II, are not unreasonable considering the wide parameters of their research. As long as there was no chance of overexploiting the minke population, he believed that even a larger sample size would have scientific value. While Walløe acknowledged that the sample size was in part due to economic motivations, he claimed that this was not unusual in science. Contrary to the Memorial for Australia's argument that for a program to have a legitimate scientific purpose, it must "not [have] any other purpose," Walløe contended that scientific research was often funded by peripheral commercial activities. Not only was there precedent in fishery science in both Norway and Russia of partially funding research through fish sales, but also similar financial arrangement may be found in other fields, such as pharmaceutical research. And, archeological projects are often funded through construction and road building projects. Walløe wrote: "As long as an activity is genuinely motivated by an attempt to conduct scientific research, other additional motivations, e.g. obtaining some of the funding by selling products, may even be regarded as an advantage and not as a counter argument" (¶27).

In terms of tools used, while Walløe acknowledged that a good deal of data about whales could be gathered through non-lethal methods, data about age, stomach contents, or reproduction were impossible to obtain without a lethal take. In fact, many of JARPA II's strongest research papers would have been impossible without data obtained through lethal takes. Finally, Walløe noted that for whales, there are many strong emotions at play in their sacrificing, emotions not usually considered with other large intelligent mammals such as pigs, wolves, or moose, and thus suggested that many scientists, pointedly the experts for Australia, might not have an unbiased opinion on the necessity of lethal takes.

Mangel did not leave Walløe unanswered. Instead, he took issue with sample size and scientific methods. One of his main arguments was that Walløe never provides an alternative definition either for science, or for the scientific method. With regard to Walløe's historical examples, Mangel claimed that both Mendel and Walløe's own salmon research actually were working within existing conceptual frameworks, making their work essentially different from that of JARPA II, which gathered data without any framework. In fact, he argued that data mining is not good science, especially if it involves mining for data over the course of many years without any framework ever emerging. In terms of sample sizes, whereas Walløe drew a comparison to clinical drug trials, where larger sample sizes lead to more data, Mangel argued that drug trials and marine biology were two fundamentally different practices. Finally, he concluded that Japan could easily still research whales even if whale meat did not fund it. Like

Australian and American scientists, Japanese scientists would simply have to find a source of funding from more conventional sources.

Judgment of the Court

Twelve judges (the judges from Slovenia, Mexico, New Zealand, Russia, Brazil, the United Kingdom, China, the United States, Italy, Uganda, and India) voted in favor of Australia on the key issues. Although the Court ruled in favor of Australia, it did not endorse Mangel's definition of "scientific research." The Court focused, instead, on the earlier part of the key phrase in Article VIII: "for purposes of." The Court "reiterates that it does not seek to pass judgment on the scientific merit of the JARPA II objectives and that the activities of JARPA II can broadly be characterized as 'scientific research'. There is no need therefore in the context of this case, to examine generally the concept of 'scientific research'" (¶127). The Court was extremely careful to constantly reiterate that despite testimony trying to define science, they would not rule on that question, but rather merely on the necessity of lethal takes in JARPA II's whaling research. JARPA II failed not because it was not science, but because it was poor science.

Specifically: Japan did not consider doing non-lethal research; it presented "no evidence of studies of feasibility or practicability of non-lethal methods" (¶141). The scientific output of JARPA II was poor: "Japan points to only two peer-reviewed papers that have resulted from JARPA II to date. . . . In light of the fact that JARPA II has been going on since 2005 and has involved the killing of about 3,600 minke whales, the scientific output to date appears limited" (¶219). Additionally, while their sample size may not be unreasonable for the scope of their research, "the evidence relating to the determination of species-specific sample sizes provides scant analysis and justification for the underlying decisions that generate the overall sample size" (¶198). Finally, the Court added: "Other aspects of JARPA II also cast doubt on its characterization as a programme for purposes of scientific research, such as its open-ended time frame, its limited scientific output to date, and the absence of significant co-operation between JARPA II and other related research projects" (¶226). Thus, the Court concluded: "Taken as a whole, the Court considers that JARPA II involves activities that can broadly be characterized as scientific research, but that the evidence does not establish that the programme's design and implementation are reasonable in relation to achieving its stated objectives. The Court concludes that the special permits granted by Japan for the killing, taking and treating of whales in connection with JARPA II are not 'for purposes of scientific research' pursuant to Article VIII, paragraph 1, of the Convention" (¶227, cross-reference omitted). This implies some other, "true," purpose, presumably the perpetuation of "whale eating culture" (Blok 2010, 66).

The ICJ, unlike the *Daubert* Court, resisted Australia's invitation to engage in demarcation. The Court, instead, took the position that characterizing scientific research along a general continuum of quality was an easier, or perhaps a more sensible, task than devising demarcation rules. This solution is generally consistent with what many philosophers of science, as well as historians, sociologists, and adherents to science studies might advocate. Indeed, it hews closely to Laudan's (1982) position in his

critique of Ruse's testimony in *McLean* that creationism is better characterized as poor science than as non-science.

While the majority generally avoided philosophy of science, one judge could not resist the temptation—so common in such circumstances, and one to which the *Daubert* Court capitulated—to invoke the philosophy of Popper (1965), seemingly oblivious to its currency (or lack thereof) in professional philosophical circles (Edmond and Mercer 2002). In a concurring opinion, Judge Cançado Trindade waxed poetic on

> the legacy of Karl Popper, who used to ponder wisely that scientific knowledge can only be uncertain or conjectural, while ignorance is infinite. Scientific research is a search for truth, amidst conjectures, and, given one's fallibility, one has to learn with mistakes incurred into. One can hope to be coming closer to truth, but without knowing for sure whether one is distant from, or near it. Without the ineluctable refutations, science would fall into stagnation, losing its empirical character. Conjectures and refutations are needed, for science to keep on advancing in its empirical path (¶74).

These reflections seemed to have little connection to Judge Cançado Trindade's conclusion, however, which was that whales should not be taken because they are not inexhaustible.

Dissents

The judgment was characterized by numerous dissents, concurrences, and judicial "declarations." The dissenting justices on the key issues were those from Japan, France, Morocco, and Somalia. Many of the dissents involved jurisdictional issues that do not concern us here (*Declaration of Judge Keith* 2014). Of greatest interest to us is the dissenters' argument that the majority was wading into scientific debates in which it had no competence. Judge Owada, for example, contended, "this Court, as a court of law, is not professionally qualified to give a scientifically meaningful answer, and should not try to pretend that it can" (*Declaration of Judge Keith* 2014, ¶24). Similarly, Judge Abraham opined "In seeking to determine whether the design and implementation of a scientific research programme reasonably correspond with its stated aims, the Court is assuming the status of a scientific committee rather than carrying out its function of ascertaining the nature of the activities in question" (*Summary of the Judgment* 2014, 8). Likewise, Judge Bennouna "considers that the Court, in engaging in an evaluation of JARPA II, has, in certain respects, substituted itself for the bodies created by the Convention, namely the International Whaling Commission and the Scientific Committee" (*Dissenting Opinion of Judge Bennouna* 2014). In fact, he believed that the entire decision was a "perilous exercise" in which the Court engaged in a paradox by seeking "to determine the purpose of a given activity without having first clarified what that activity consists of" (3). Finally, Judge Yusuf, while bemoaning the "killing of these iconic and intelligent animals" (¶2), also asserted that it is not "the task of the ICJ to review and evaluate the design and implementation of a research plan for scientific whaling...That is the function of the Scientific Committee of the International Whaling Commission" (International Whaling Commission 2014a, ¶4). In addition, Judge Keith,

despite voting with the majority, agreed: “Nor is it for the Court to decide on the scientific merit of the programme’s objectives nor whether its design and implementation are the best possible means of achieving those objectives” (*Declaration of Judge Keith* 2014, ¶8).

These arguments, of course, evoke Chief Justice Rehnquist’s dissent in *Daubert*, which claimed the majority, by asking judges to evaluate the merits of scientific research by themselves without deferring to the scientific community, would turn judges into “amateur scientists” (1993, 601), or, more precisely, we would note, amateur philosophers of science. The dissenters noted that a scientific body existed with the expertise to evaluate the quality of JARPA II as “scientific research”: the IWC Scientific Committee. Thus, the dissenters posited a “deference model,” which evokes the *Frye* (1923) decision that *Daubert* (in some U.S. jurisdictions) superseded. The deference model holds that judges should not try to make scientific judgments but rather should merely attempt to gauge the weight of opinion within the “relevant scientific community.”

Conclusion

The majority’s reluctance to embrace the deference model was perhaps understandable. In the controversy over whaling, Blok (2010, 70) argues that science has become “post-sovereign” and thus unable to resolve the controversy. “Scientists are essential actors in both anti- and pro-whaling assemblages; but they are internal to the struggles, not in positions to neutrally adjudicate between adversaries.” Under such circumstances, the deference model seems problematic.

Whaling in the Antarctic also illustrates the merits for courts of avoiding demarcation exercises. The Court perhaps sensed the potential pitfalls of Australia’s tendentious four-part test for “scientific research” and instead embarked on a qualitative evaluation of JARPA II as a scientific program that was broadly consistent with pragmatic, as opposed to dogmatic, approaches to philosophy of science. It can reasonably be argued that this allowed the Court to invest considerable energy in the kind of ethnographic analysis of JARPA II as a research program that these broadly pragmatic approaches call for (e.g., Caudill and LaRue 2006, 104-19; Jasanoff 2006).

Japan’s recent announcement that it intends to commence a new scientific whaling program next season illustrates the pragmatism of the ICJ’s approach. The new program is “based upon international law and scientific evidence to the Scientific Committee of the International Whaling Commission (IWC),” and it explicitly “reflects the criteria mentioned in the Judgment” (Fisheries Agency 2014). *Whaling in the Antarctic* did not succeed in ending whaling or even ending Japanese whaling. While many environmental and animal rights activists would like to bring about an absolute end to whaling, such a mandate would be difficult to derive from the Convention. Aboriginal whaling, moreover, complicates the moral issues. What the ICJ achieved, therefore, can be discerned in the details of the new Japanese program. The proposed take is much smaller than in JARPA II, and it is limited to minke whales (The Editorial Board 2014), which, it should be noted, are not endangered. Thus, *Whaling*’s impact will be to limit

and reduce the Japanese whaling program, not to bring about an absolute ban on whaling--to decrease, if not cease, the killing.

Whaling in the Antarctic reads much less like a demarcation exercise than does *Daubert*, with its reference to Popper. Even *Daubert,* however, contains language advocating "flexibility" that frees judges from any binding obligation to apply its demarcation criteria in any particular case. The judicial application of *Daubert* has been much criticized for using this flexibility language as license to make "political" decisions. In particular, American judges have been criticized for their asymmetric deployment of *Daubert* in civil and criminal cases (e.g., Risinger 2000; Edmond and Mercer 2004; Berger 2005; Dwyer 2007; Rozelle 2007; Dioso-Villa 2010; Edmond and Roach 2011). *Whaling in the Antarctic* would seem to allow future ICJ judges at least as much flexibility as *Daubert* does to decide "politically" in future cases before the ICJ in which the nature of scientific knowledge, research, or practice are at issue. The coalition of environmental and animal rights activists who celebrated *Whaling in the Antarctic* may not necessarily benefit from the ICJ's flexible approach in future cases.

In short, what we call, above, pragmatism, some might call politics. It would be easy to argue that *Whaling* itself is a political decision. The politics of whaling are well known; most countries find industrial whaling distasteful if not abhorrent, and it is widely believed that the ostensible "scientific purpose" of the Japanese whaling program is a facade. It is certainly possible to suppose that such views are at least in part behind the majority decision. It is also possible to imagine a philosopher of science intervening, much in the way Fuller intervened in *Dover,* on the side of Japan by insisting that, though she found whaling personally repugnant, there was no consistent way to demarcate JARPA II from other activities we want to say are carried out "for the purposes of scientific research." So while *Whaling* may be pragmatic, it is certainly not apolitical.

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[1] The IWC does not define 'whale.' Any species outside of the 13 'Great' whales are considered to be 'small' whales. These include species like beluga whales, porpoises, dolphins, and orcas. According to the IWC, 'Great' whales include: Bowhead whale, North Atlantic right whale, North Pacific right whale, Southern right whale, Blue whale, Fin whale, Sei whale, Bryde's whale, Common minke whale, Antarctic minke whale, Humpback whale, and Sperm whale.

[2] Different commentators have characterized "the *Daubert* standard" as having different numbers of parts. While *Daubert* is commonly described as a "four-part" test, others have suggested it is better described as five-part test because one "part" contains two separate and seemingly unrelated concepts ("error rate" and "standards"). One commentator argues that depending on how the "factors" are parsed, *Daubert* could be described as having between three and nine "factors" (Risinger 2010, 527-8). Still others include more factors mentioned in the opinion or in other opinions (Adrogue and Ratliff 2000, 438-9; Risinger 2010, 528). Finally, we prefer the interpretation which holds that *Daubert* is in fact a two-part test: to be admissible expert evidence must demonstrate "relevance" and "reliability," and the four (or five or more) factors are merely indicia of the concept of "reliability" (Haack 2008, 1059).

[3] Dr. Walløe also co-authored a paper with data from JARPA II (Konishi et al. 2013).