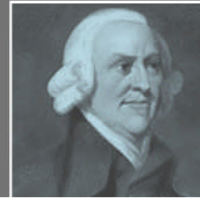


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EPISTEMOLOGY

Examining Knowledge in
Economics, Psychology, and Sociology



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INTRODUCTION

Epistemology is the study of knowledge; that is, what *can* be known, the explanation what *is* knowledge, and the study of how things *are* known.

The purpose of social sciences in general is to study the subjective, inter-subjective and the structural aspects of society so that the body of knowledge generated will provide both explanation and prediction of human behavior in a society.

This paper examines the epistemologies of three social sciences: psychology, sociology and economics. More specifically, the paper will look at how each of these social sciences goes about creating and validating what can be known in their respective disciplines. Each of them formulates theories, collects and analyses data, and verifies the data according to theoretical frameworks. Although psychology, sociology and economics all examine the same set of socio-cultural phenomena in any given society, none of these disciplines is unified within itself.

However, the degree of fragmentation, and the impact it has on the research produced by the discipline, differs. Additionally, research in each discipline is more similar to research in the same discipline than other discipline. The disciplines can be described as internally chaotic but externally identifiable.

It is important to examine how knowledge is created within the discipline. Such an understanding could be used to increase communication across the discipline; lacking a translation between the epistemic traditions in each discipline, research from another is likely to be rejected. An initial understanding of the epistemologies of each discipline is also necessary for a criticism of the epistemologies within, or across, discipline; constructive research could compare the relative merits of different epistemologies, and suggest where each discipline could learn from the corrected mistakes of other disciplines.

This paper will provide a general review of how knowledge is created in the social sciences: data acquisition, methodology and justification. Each discipline is described in turn. The following section provides the philosophical context to this examination of the epistemologies of each discipline.

EPISTEMOLOGY

DATA

There are two components to acquiring data. The first is to determine what to measure, and the second is performing the actual measurement. Within each discipline, the choice of what to measure is non-arbitrary. That is, theory determines what is important to measure, and approximately what it is they would like to measure. Economics, for example, may choose to

measure the opportunity cost of certain actions, psychology intelligence, and sociology the influence of a social structure. As well as determining the nature of the phenomena to study, theory also influences how scientists measure the phenomena. It is unlikely that a psychologist would measure intelligence by recording how high you can jump. It is the dependence on what, and how, to study that leads Thomas Kuhn (1996) to declare that “scientific fact and theory are not categorically separable” (Kuhn, 1996, p. 7). Observations are “theory-laden,” and reflect the theory which generated the observations. The theory-ladenness of observations is influenced both by instrumentation and by theoretical assumptions.

Kuhn cites an example of how a change in instrumentation changed theory. In 1781, a celestial body that “had been observed off and on for almost a century was seen differently” (Kuhn, 1996, p. 115) because “it could no longer be fitted to the perceptual categories” (Kuhn, 1996, p. 116) which the existing theory provided, such as a star. The astronomical theory defined what to measure (celestial objects), and how to collect the data. The data collected allowed astronomers to label the object as a star, which precluded it from further analysis. A change in the instrumentation allowed astronomers to modify their theory, which in turn led to a substantial re-classification of existing data: they had constructed a classification system with the data they could collect, and assumed it was correct. They persisted in maintaining their theory until changes in instrumentation allowed them to see that their theory was incomplete.

The social sciences inherit the challenges in measurement the physical sciences do (Yeager, 1957), but face the difficulty that much of the phenomena they are interested in are not directly accessible. How does a sociologist go about measuring social structure? Can they measure the length, width, and breadth of it? The increased inaccessibility means that social scientists rely on their theories more, and thus their data will be more theory-laden than that of the physical sciences. The inaccessibility also translates into an increased difficulty determining whether or not it is *possible* to measure what they want to using the chosen instrumentation.

METHOD

The method of a discipline is how it creates and supports theories, or new knowledge. At the most general level, there are two types of methods: deductive and inductive. Deduction takes certain theoretical postulates, and draws a logically necessary conclusion. If the premises are true, then the conclusion will be true. Induction examines the data to either generate a theory which explains the data. Karl Popper (2002) proposed something of a hybrid model of deductively deriving a hypothesis, and then ‘testing’ it against the empirical data. Logically, his approach is still deductive; it involves deriving a hypothesis, and then adding the results of the experiment as an assumption in the logical argument. If the assumption contradicts the derived hypothesis, some assumption used to derive that hypothesis is wrong. However, the Duhem-Quine hypothesis (Quine, 1975) presents a challenge to Popper’s account. If the inductive component contradicts the deductively derived conclusion, then identifying the assumption which needs to be changed is non-trivial. Further, any arbitrary assumption can be held true if sufficiently large changes are made amongst other assumptions.

The methods the practitioners of a discipline choose to employ are a consequence of both how they believe knowledge should be justified, and also of the data they have collected. An economist may firmly believe that the only way to test the efficacy of a policy proposal is to run a double-blind experiment, but regardless of how convincing it would be that method is impossible.

Certain methods may be employed to a greater extent by one discipline, but methods in themselves do not define a discipline. The choice of a method is bounded by the data the scientist has available; it is not arbitrary. A scientist is likely to choose methods which have proven successful in the past. The success of certain methods is a result of how well a method has justified knowledge in the past; therefore, the methods appropriate to a discipline are the result of both measurement and prior success. Justification is a key component in the choice of future methods by practitioners.

JUSTIFICATION

Plato asked in the *Thaestus* “What must be added to true belief to get knowledge?” The answer – justification – merely labels whatever must be added. Philosophers have provided a number of definitions of justification, but have thus far failed in their attempt to arrive at a normative solution. Richard Fumerton (2002) outlines a number of contemporary epistemological theories of justification. Such theories can be divided into internalism and externalism; the former claims that the foundation of knowledge can be located within each individual, whilst the latter claims that justification must come from external validation. However, the former is unsuitable for science, and the Gettier problem undermines the latter. Epistemological definitions do not provide a reliable criterion for justification.

The philosophy of science has likewise attempted to define justification in an effort to understand how science “progresses.” The efforts to find a rational account of what suffices for justification within science has failed. A rational account must provide an unchanging vantage point from which to judge rational and irrational choices – good and bad justifications. Justifications could be evaluated either in terms of how well they represent reality, or with reference to a known truth. Unfortunately, determining how well a justification corresponds to reality requires knowing what reality is; such knowledge obviates the need for justification entirely. Furthermore, Quine (1951) persuasively rejected the existence of *analytic*, or *a priori*, truths. The lack of analytic truths would make a rational account of justification nearly impossible.

Lakatos (1980) provides an alternative; identify the core components of a theory and hold them as true. Justifications can be judged with respect to how well they adhere to the precepts of the theoretical core. There are two problems with this account. The first is that the core components can be false, thus creating what Lakatos would call a degenerating research program. The second, and more serious, is that it requires an unchangeable theoretical core. There is both the practical problem of actually identifying that core, and the philosophical problem with the actual existence of that core. A logical consequence of the Duhem-Quine hypothesis (Quine, 1975), which states that any statement within a theory can be held true if arbitrarily large changes are made

elsewhere in the theory, is that there are no unchangeable components of *any* theory. Thus, justification cannot be based off of a protected theoretical core, because there is no such core. The lack of a rational account for justification within science leaves the alternative of irrational accounts.

The most prevalent alternative has been advocated by Thomas Kuhn (1996), who argues that science is a social activity regulated by social norms. A real science exists within a paradigm, which is a socially-constructed account of what questions to ask, what methods were appropriate, and when a new theory was justified. His irrational account provides us with the final source of justification: scientists. Other practitioners provide justification for new knowledge. Without that externally-provided validation of the scientists' methods, the research cannot be said to be justified. Consequently, justification is socially provided; or, scientists cannot work within a vacuum.

ORGANIZATION

This paper will therefore examine each discipline as a whole, and attempt to determine both what constitutes the discipline and how individual scientists participate within the discipline. The emphasis will be on examining how knowledge is created and disseminated throughout the discipline, as produced by individual scientists influencing each other. The key questions the paper attempts to address are *How is new knowledge accepted within the discipline?* and *What defines, or unifies, the discipline as a discrete field?* The paper will address first psychology, followed by economics and sociology.

PSYCHOLOGY

INTRODUCTION

The American Psychological Association (APA) explain that psychology is divided into research and practice; “some psychologists do basic research [... while] other psychologists apply the discipline’s scientific knowledge” (American Psychological Association, 2010). Research psychologists “develop[...] theories and test[...] them through carefully honed research methods involving observation, experimentation and analysis” (American Psychological Association, 2010). Despite the clean categorization the APA provides, other psychologists claim that “psychology is viewed not as a unified discipline but as a collection of psychological sciences” (Dewbury, 2009, p. 284). Even taking the research/praxis division into account, psychology has a large number of division that do not interact with each other. The question is whether or not psychology has a unifying theory to which all subspecialties either contribute to or draw from.

UNDERGRADUATE EDUCATION

If a unifying theory exists, it should be present in the common core of knowledge presented in undergraduate introductory courses. While some researchers claims that “recent studies have nonetheless been able to identify a number of core concepts in the introductory curriculum ranging from as few as 64 using a 100% inclusion criteria in 10 [text]books, to 141 in 75% of 52 [text]books” (Nairn, Ellard, Scialfa, & Miller, 2003, pp. 93-94), other research claims that “a consideration of the recent findings of studies analyzing undergraduate textbooks suggests that such a core of knowledge in psychology is nonexistent” (Griggs, Proctor, & Bujak-Johnson, 2002, p. 452). Some of the disagreement is a result of methodological approaches. Griggs et al (2002) explain that of 6,687 distinct terms that appear in glossaries, only 6% (401) were shared across even a simple majority of introductory textbooks. Nairn et al (2003), on the other hand, did not look at glossaries at all, and instead “catalogue[d] all concepts in a heading, subheading, boldface type, or italics, as well as those concepts given explicit definition” (Nairn, Ellard, Scialfa, & Miller, 2003, p. 95). However, Griggs et al (2002) also point out that textbooks in introductory or foundational courses there is “little similarity in what journal articles are referenced and what people are cited” (Griggs, Proctor, & Bujak-Johnson, 2002, p. 453); nor do they refer to the same famous psychologists – Freud and Skinner being the only psychologists referenced in all introductory texts.

Undergraduate degrees in psychology have similarities, but there does not seem to be a core. As one psychologist describes, a psychology degree “usually but not invariably requires an introductory course in psychology, a course in experimental psychology, a course in statistics, and a choice of several additional courses” (Rosenzweig, 1991, p. 17) from areas such as abnormal, developmental, learning, personality, physiology, social, and psychometrics. Given that introductory textbooks seem to have considerably different conceptions of what is important in

psychology – and corresponding differences in what they cover, even if they do draw from similar specialties – the only courses of note shared by all psychology undergraduates are experimental methods and statistics. Within psychology, both courses cover essentially the same thing – that is, statistics is typically limited to teaching students how to analyze the data gathered from experiments. Undergraduate psychology does not seem to have a common core of knowledge which students acquire and then specialize in; rather, psychology seems to be comprised of a number of sub-specialties that employ a similar methodological approach.

GRADUATE EDUCATION

Graduate education presents a similar picture of the discipline. Griggs et al (2002) claim that “there is no common core in doctoral education” (Griggs, Proctor, & Bujak-Johnson, 2002, p. 452), and even that “graduate education in American psychology has never followed an agreed-upon curriculum” (Ludy T. Benjamin & Baker, 2001, p. 98). The lack of a core curriculum is not for want of trying. The APA has historically organized several conferences to discuss graduate education. In 1949 at the Boulder Conference members discussed how “the clinical psychologist must be trained as both a scientist and a professional and that the training model needed to integrate both a university and an internship experience” (Belar, 1992, p. 287); this scientist-practitioner was reaffirmed for all graduate programs in 1956 (Stanford Conference) and 1959 (Miami Beach Conference), and remained the dominant recommendation – although not enforced, or even suggested for all types of programs – until 1987. At the Utah Conference, psychologists concluded that “diversity in educational approaches was accepted, with differing emphases on basic science, applied science, and practice aspects, but training in the conduct of psychological research was seen as being fundamental to all psychology” (Belar, 1992, p. 296). Graduate programs should emphasize research methodology, which essentially unifies psychology.

Currently, the APA accredits graduate programs for psychology; “as of the beginning of 2009, there [were] over 370 accredited doctoral programs” (American Psychological Association, 2009, p. iv). The APA specifies requirements for graduate curricula. It requires curricula to address the “breadth of scientific psychology, its history [...], its research methods, and its applications” (p. 7) and do so by covering at least the “biological aspects of behavior; cognitive and affective aspects [...] social aspects [...] history and systems of psychology; psychological measurement, research methodology, and [...] data analysis.” (p. 7). Furthermore, the doctoral program must cover the foundations of the area “in which the program has its training emphasis” (p. 7), and to do so must discuss “individual differences in behavior; human development; [and] dysfunctional behavior or psychopathology” (p. 7). However, these criteria do not identify a common core, nor do they guarantee that doctorate programs provide the same education. The requirement of doctoral programs to discuss the biological, cognitive, and social aspects of behavior can be conflated to merely “discuss behavior” which seem to be a goal of psychology in general. All behavior has biological, cognitive, and social aspects; the *degree* to which certain behaviors spring from one source or another is debated in some depth. The requirement is essentially identical to examining individual differences, human development, and dysfunctional behavior – which, translated,

involves being capable of identifying what behaviors are normal (individual differences), and which are dysfunctional (some z-score away from the mean). Human development refers to the concept that people change; a great deal of research in psychology is focused on development (e.g. studying children), but that is one research area and a doctoral program focusing on perception is unlikely to delve into it. The remaining aspects – measurement, methodology, and data analysis – are the core outlined in the Utah Conference in 1987.

Psychologists routinely point out that the only area of shared study was methods, and this situation is not changing. In 1991, Rosenzweig pointed out that doctoral programs are incredibly variable, in that “most programs for the Ph.D. degree require a few basic graduate courses, for example, in advanced statistics and/or research methods, but thereafter the program is determined individually by the graduate student and his or her faculty advisor” (Rosenzweig, 1991, p. 17). Eighteen years later, Dewsbury (2009) points out that “in many departments, the only common core courses shared widely among students in different areas are those in statistics and methodology” (Dewsbury, 2009, p. 286). While during the 1970s and 1980s graduate programs may have shared “courses in learning, perception, history, and other subjects” (Ludy T. Benjamin & Baker, 2001, p. 98), that has changed and “few such uniform requirements exist today, other than a methodological sequence” (Ludy T. Benjamin & Baker, 2001, p. 98). Furthermore, graduate transcripts of job applications show increasing specialization. Transcripts these days “typically list the bulk of coursework in the major field (e.g., perception or industrial psychology), a second cluster of methods courses, and, lastly, no more than two to four other psychology courses that define the ‘breadth’ of the psychologist’s education” (Benjamin, Jr., 2001, p. 740).

PHILOSOPHICAL FRAMEWORK

Despite lacking a common theoretical core, psychology shares a common philosophical framework. The framework provides some common ontological commitments which serve to delineate acceptable objects for examination, and acceptable explanations for those actions. At the turn of the 20th century, “prominent psychologists [were] using relatively private strategies for studying psychological phenomena” (Corrigan, 1995, p. 209), such as “the introspective methods of Wundt, [...] the concern with Freud’s unconscious, [...] or the idealistic psychology of the Gestaltists” (Corrigan, 1995, p. 209).

The unifying factor behind these research strategies was the understanding that psychological matter existed internally; that is, within the mind. The material of interest to psychology was not directly accessible externally. At most, certain behaviors or beliefs could result from an internal process. The externally accessible data was not sufficient to understand the internal processes, as multiple possible internal processes can generate the same result.

For instance, a psychologist may examine an individual who claims to hear voices. The individual may be extremely convincing, which would indicate that there is some mental process producing the voices – a mental process of considerable interest to psychology. However, if we have another individual who has been instructed to *act* like they hear voices, they may produce the same

external results; but lack the internal mental process. Admittedly this example is artificial, yet it remains that there are people who fake psychological symptoms; frequently in an attempt to obtain drugs.

In 1913, John Watson published his influential paper *Psychology as the Behaviorist Knows It*. He rebelled against the internal strategies promulgated by earlier psychologists. He charged psychology of the time with trying to “to make consciousness, as the human being knows it, the center of reference to all behavior” (Watson, 1913, p. 160). The understanding of human consciousness was taken to be the source of behavior, so according to Watson psychologists tried to “reason by analogy from human conscious processes” (Watson, 1913, p. 160) to explain all behavior.

The focus on consciousness produced introspective methods to observe consciousness; the methods, of course, required training. Watson found the notion of attempting to employ experimental techniques with subjective measures absurd, as “if you fail to reproduce my findings, it is not due to some fail in your apparatus or in the control of your stimulus, but it is due to the fact that your introspection is untrained” (Watson, 1913, p. 163). The explanation for failure is attributed to “the observer and not upon the experimental setting” (Watson, 1913, p. 163); which made developing repeatable experiments quite difficult.

Watson proposed behavior psychology as the solution. He defined behavioral psychology as a “purely objective experimental branch of natural science” (Watson, 1913, p. 158). He rejected earlier methods entirely, explaining that “introspection forms no essential part of its methods, nor is the scientific value of its data dependent on the readiness with which they lend themselves to interpretation in terms of consciousness” (Watson, 1913, p. 158). In fact, he discarded consciousness entirely; he reconfigured psychology to have the “goal [of] the prediction and control of behavior” (Watson, 1913, p. 158).

In doing so, Watson relegated consciousness to non-existence. His claim was not merely that consciousness, being impossible to study, was not a valid object of study for psychology. He rejected the earlier account of human consciousness as driving behavior; of there being consciousness at all. He claimed that behavioral psychology “recognizes no dividing line between man and brute” (Watson, 1913, p. 158); one cannot attribute differences in behavior between humans and animals to human consciousness. Consciousness, as prior psychologists understood it, does not exist: it is an illusion.

Behaviorism became more influential, particularly when B. F. Skinner invented operant conditioning in the 1930s. Operant conditioning provided a model for learning: how behavior changed over time, and why one behavior was preferred to another. It allowed him to “[renounce] the ‘black box’, instead promoting the essential importance of directly *observed* behavior.” (Corrigan, 1995, p. 209). An organism is defined by its behavior, which is the only feature of an organism that matters. Skinner founded radical behaviorism, which has “maintained that man’s actions should be explained only in terms of observable variables, without any inner vicissitudes

at all. The appeal to hypothetical mechanisms is said to be speculative at best, and deceptive at worst. For them, it is legitimate to speak of stimuli, responses, reinforcements, and hours of deprivation, but not of categories or images or ideas" (Neusser, 1967, p. 5). Skinner propagated an ontology which explicitly assumed that human consciousness, the mind, did not exist. Behavior was the only acceptable object of study. Certainly, not all areas of psychology succumbed. The study of personality, pioneered by Sigmund Freud, resisted behaviorism as much as possible.

As behaviorism came to dominate the philosophical landscape, psychologists began to feel constrained. The emphasis on the examination of behavior, and particularly on the inability to explain behavior in terms of mental processes, was stifling. In the 1960s, psychologists began to reject the idea that "humans are [...] mindless vessels implanted by reinforcers with generalized behavior classes" (Bandura, 1996, p. 329). In searching for an alternative, some psychologists thought to apply the principles of computers, particularly contemporary research on artificial intelligence, to explain the human mind. Psychologists invented "cognitive models [which] describe the black box [the human mind] are formal, comprised of structures, operations, and products that explain how information is acquired and manipulated to form new constructs" (Corrigan, 1995, p. 210). They moved beyond the ontological restriction established by Watson and Skinner, and opened up the human mind to explanation. The "capacity for self-reactive influences enables people to regulate their own motivation and behavior" (Bandura, 1996, p. 330) as opposed to simply learning certain behaviors in the same way a pigeon does. People using consciousness processes – in the new language, cognitive processes – were capable of more than reacting blindly to some presented stimuli. The ontological transformation from humans as identical to animals to humans possessing mental faculties beyond those of animals allowed researchers to gain a fuller understanding of why people behave the way they do" (Bandura, 1996, p. 329). The success of the cognitive shift "worked its way into virtually every area of psychological investigation" (Goodwin, 1999, p. 422), to the point where "some people now consider cognitive psychology to be an all-encompassing framework for modern psychology" (Goodwin, 1999, p. 422).

However, the cognitive shift was an evolution of behaviorism: it did not *reject* behaviorism. It started from the realization that behaviorism, with its restricted ontology, was insufficient to explain human behavior. It expanded the ontology to include cognition both as an object of study, and as a way to explain results. Watson and Skinner succeeded in shifting psychology to examining behavior. The cognitive transformation added cognition, which allowed psychology to return to its "objects [...] mind, behavior, and personality" (Ash, 2005, p. III). But the transformation is very much additive; despite modifying the ontology, the methodological critique Watson charged psychologists with remained unchanged. Psychologists continue to emphasize external, objective measures; they do not employ introspective techniques.

MEASUREMENT

A significant number of psychological “constructs of interest are not clearly defined and cannot be measured directly” (Browne, 2002, p. 171). Psychologists have developed tests to “measure concepts as diverse as intelligence, extraversion, quality of life, client satisfaction, neuroticism, schizophrenia, and amnesia” (Borsboom, 2005, p. 1). There is a twofold difficulty in measuring these concepts; first, they are not directly accessible; and second, the concepts are assumed to exist. In response to the first difficulty, because psychological “constructs are, essentially, unobservable. One cannot directly observe neuroticism, extraversion, dependency, or any other inferred trait” (Smith G. T., 2005, p. 396), psychologists have developed means of doing so indirectly – psychometrics. In response to the second difficulty, psychologists accept the risk; they operate within the theoretical structure. It is certainly possible that what psychologists considered one concept is the result of two or more interacting, or perhaps multiple different concepts are the result of one underlying concept; such as the relationship of intelligence to the *g* factor.

Modern psychologists distinguish between “classical psychometrics [which] models at the level of the observed test score [and] modern psychometrics, or item response theory, [that] models at the level of the observed item response” (Mellenbergh, 1996, p. 293). However, item response theory is still relatively uncommon; only 13% of doctoral programs require it. Furthermore, that statistic has been increasing for the last two decades, so a larger proportion of currently practicing psychologists are unfamiliar with it. As one psychologist puts it, “you may be able to find a handful of psychologists who know of [other approaches, but] every psychologist knows about true scores, random error, and reliability” (Borsboom, 2005, p. 11). The conventional view remains classical psychometrics.

OPERATIONALIZATION

The residual influence of behaviorism in psychology is clearly seen in its preoccupation with operationalization. Operationalism is the practice of defining the theoretical phenomena *as* the results of the measuring instrument. The “appeal of operationism is due to its strategical value for avoiding *ontological questions*” (Weber, 1942, p. 55); behaviorists could measure *anything* so long as they could devise an operational measure for it – no matter how abstract. Some form of operationalism is required when attempting to measure concepts that are not directly accessible.

Psychometrics employs operationalization when it sets out to measure “happiness.” The psychologist would devise some sort of instrument, such as a test, and then operationalize happiness as the results of the test. For example, psychologists could operationalize “stress [...] as the number of daily annoyances from a list of 20 that a person claims to have endured during the past week” (Strube, 2000, p. 25).

Once operationalized, “the meaning of a theoretical term is synonymous with the operations by which it is measured” (Borsboom, 2005, p. 41). Psychologists can draw conclusions from their experiments, confident that if there were any problems, they could attribute the results to poor

operationalization. For instance, if the effect size of a test turns out to be tiny, the psychologist can explain the small effect size by claiming that the operationalized definition has only a weak relationship to the actual concept. The theoretical concept has a greater impact than his/her measurement instrumentation recorded.

The use of operationalization has made psychologists very sensitive to both validity and reliability. Validity is the extent to which what was measured actually represents what the psychologist *wanted* to measure; or the ‘truth’ of the measurement. Reliability “refers to test scores, not tests, [...] validity refers to the accuracy and appropriateness of test score interpretations” (Reynolds, 2010, p. 3). Reliability is the degree of variation in test scores, while validity is how well the test corresponds to ‘reality.’ Psychological research may be impeccably done, but if the validity of the measure is untenable the research is of no substantive value.

CLASSICAL ERROR

Psychologists recognize that “the measurements that are available are subject to substantial measurement error” (Browne, 2002, p. 171). The approach to dealing with measurement error has remained largely unchanged since Francis Edgeworth (1888) studied a set of academic examinations he had graded in an attempt to ascertain some underlying factor. He pointed out that if some mass is measured by a rough instrument, the weight is unlikely to be accurate; but repeated measures should form a normal distribution. When looking at the results from the exams he had graded, he operated from that analogy, and concluded that “a similar grouping of divergent estimates prevails when we are weighing – not physical mass – but intellectual worth” (Edgeworth, 1888, p. 601). Edgeworth’s principle of “decompos[ing] observed test scores into [a] ‘true score’ and an ‘error’ component [...] became] the most famous equation in psychological measurement: $O_{\text{bserved}} = T_{\text{rue}} + E_{\text{rror}}$ ” (Borsboom, 2005, p. 11).

The observed results are assumed to “ha[ve] a distribution with a finite mean and variance over (hypothetical) repeated administrations of the same test to the same subject [...] in the strong [case], it is assumed that the distribution is normal” (Mellenbergh, 1996, p. 294). The finite mean is interpreted as the true score plus the average of the error term. Ideally, the error term would have a mean of zero, so that repeated testing would cancel out the errors and reveal the true score.

Since the true score is essentially the expected value of the observed score over replications (Borsboom, 2005, p. 14), it is difficult to “estimate the individual test score variances” (Mellenbergh, 1996, p. 295). Practically speaking, the same person doesn’t take the same test multiple times. Furthermore, even if the same individual *did* take the same test some number of times, the results would not be randomly distributed due to the individual (i) becoming familiar with the test and changing their test-taking procedure, or (ii) a consistency bias to give the same answer to a given question as in previous tests.

However, psychologists do estimate the population test score variances. A test is *reliable* if it has low error variance. Psychologists estimate error variance by “parallel test, test-retest, or internal

consistency methods” (Mellenbergh, 1996, p. 295). Parallel tests method employs two different tests which ostensibly measure the same thing, and takes the correlation between them. A high correlation “could be taken to be a direct estimate of the reliability of the test scores” (Borsboom, 2005, p. 28). Test-retest is the variance in scores people have when they take it multiple times. An example of an internal consistency test is Cronbach’s α which examines the correlation of each individual response with the overall test result. Another internal consistency test is split-halves: splitting the test into two halves, and measuring the correlation between both halves. If each question measures the true score, each half will be perfectly correlated with the other. It is important to note, however, that reliability is a population-level measure. Psychologists can only discover how reliable the tests are *on average*; they neither predict nor explain the variation in test scores. The variation is assumed to be random, and inescapable, error.

CONSTRUCT VALIDITY

Perhaps due to the prevalence of operationalization, or the fact that psychologists perform most of their data collection themselves, psychologists spend a great deal of time discussing validity.

Validity is frequently tossed around, and often translates as ‘truth.’ Within psychometrics, however, validity is most frequently *construct validity*. Construct validity is the degree to which the test measures what it is intended to measure. A psychologist may devise a highly reliable test for intelligence – for example, the size of one’s big toe – that will nonetheless have no construct validity, as the size of one’s big toe is unlikely to have anything to do with intelligence.

Since psychological constructs are the result of psychological theory, there is no direct way to check the validity of a test. The check for validity “requires corroboration of a given test’s results with an external criterion. Correlation and alternative evaluations, including subjective evaluations and other more objective tests, allows a check on how well a test measures and what it purports to measure” (Von Mayrhauser, 2002, p. 307). Psychologists employ all avenues at their disposal to ascertain construct validity. Measurement of a psychological concept is therefore rarely a single test, but “consists of repeated attempts to measure the same construct in different ways” (Browne, 2002, p. 171). Frequently, these measurements are other psychological tests that are theoretically related.

Psychologists term the degree to which one test corroborates with another *concurrent validity*. Concurrent validity encompasses both convergent and divergent validity; that is, the results of one test have a positive correlation coefficient with a test that is measuring something similar, and a negative correlation coefficient with tests that measure the concept’s antithesis. One example is the history of the *g* quotient. Psychologists noticed that all intelligence tests positively correlated with each other. They postulated that there was some underlying feature which drove all intelligence, and called this the *g* quotient.

Additionally, each concept is the result of a theory, as are the tools to measure the concept. Therefore, the “validity of any measure is part and parcel of the validity of the theory that led to the measure” (Smith G. T., 2005, p. 397). A theory which holds that extraverted people enjoy

spending time with people more than introverted people makes two claims; first to the existence of the distinction, and second to a resulting characteristic of the distinction. A measure of extraversion may ask people whether or not they enjoy spending time with people (or, rather, using ambiguous language where the result is highly correlated to the answer to that question); but in doing so, it makes the claim that extraversion can accurately be determined by measuring how much people like to spend time with others.

A related issue is *content validity*, which is the degree to which a test measures everything involved in a concept. For instance, one component of extraversion could be that extraverted people find it easier to think out loud in a social setting. A psychologist could operationalize extraversion as the number of related words an individual can come up with in one minute, in either a social situation or on a silent test. The test may have high reliability and be highly correlated with extraversion; but alone it is not sufficient to measure extraversion, because extraversion measures additional things. In other words, the test would have low content validity because it is only testing a subset of the concept – the results of research on the subset cannot be extrapolated to the entire concept.

Construct validity involves not only the degree to which a test measures what it is intended to measure; it also involves testing the theory which gave rise to that process. In those terms, the “validation process [...] should be understood as a system involving sound research design, appropriate data analysis, and suitable inferences from one’s findings” (Smith G. T., 2005, p. 397). The data in psychology is – of course – not independent of the theory which prompted the gathering of the data.

METHOD

The methods which psychologists employ is the single shared experience across the discipline; methods training “in the first year of graduate training is the last bastion of a core curriculum in psychology” (Aiken, West, & Millsap, 2008, p. 32). Given its foundational nature, we would expect methodology to be similar across all the subfields of psychology, even if some employ esoteric methods as well. We can obtain a good idea of psychological methods by examining what they teach in graduate school.

In graduate school, psychologists learn both how to analyze the data – the statistics – and how to acquire the data. Acquisition involves operationalizing a concept, creating instrumentation, and running participants through some sort of data-collection procedure. Graduate students take specific classes on data collection methods; however, those methods vary greatly by the specialty within psychology. The analysis techniques, on the other hand, are shared across psychology students; and the analysis techniques constrains the type of data collection practitioners engage in. In this case, the shared statistical background should indicate similar preferences for acquiring and analyzing data.

METHODS IN GRADUATE SCHOOL

A majority of graduate students are exposed to a foundational grounding in statistics and their accompanying data-collection methods, consisting of experimental design and analysis, multiple regression, and measurement. A study by Aiken et al (2008) found that graduate students take an average of 1.5¹ years of statistics (excluding quantitative psychology programs²), compared with the requirement of 1.2 years, which is enough to cover the three semesters listed above. As a consequence, newly minted psychologists have a very similar understanding of research methods, as opposed to specializing in advanced methods. The methods focused on were laboratory experiments, analyzed with ANOVAs.

Program directors also provided whether they thought a majority (>75%) of graduates could apply various techniques. The results emphasize the primacy psychologists place on controlled experiments. The vast majority of directors responded that graduates could design laboratory experiments; only 4% said they thought few (<25%) graduates could design and carry about a laboratory experiment. Most thought that their graduates could apply field experiment designs, with 11% of program directors claiming that their graduates could not. However, other designs were not stressed as much in the curriculum or applied in the literature, and thus directors did not think significant numbers of graduate students could apply alternative designs (time series, nonequivalent control groups, longitudinal, qualitative, single-subject, etc) effectively; an average of roughly 10% of programs prepared most graduates to effectively apply the alternative designs.

Overall, Aiken et al (2008) concluded that graduate methods in psychology focused on experimental designs, analyzed using ANOVA techniques such as multifactor or repeated measures depending on the experimental design. Multiple regression is also taught nearly as much as ANOVAs, and other techniques – such as structural equation modeling – are taught in a minority of programs. The common statistical core is characterized by ANOVAs; the research design core by controlled experiments; and the measurement core by classical test theory.

However, graduate school education is changing, which may reflect a change of methods employed by practitioners. Rossen & Oakland note that eighteen years ago, 60% of doctoral programs offered a course on measurement, 36% in structural equation modeling, and 15% in survey research. Those percentages have increased to 90%, 69%, and 52% respectively (Rossen & Oakland, 2008, pp. 46-47).

Perhaps psychologists, who “have been accused of ‘physics envy’ in their rush to imitate the methodology of that science” (Dewsbury, 2009, p. 287), have embraced formalism. Indeed, one psychologist states that “it is hard to imagine any psychological model that escapes some formalistic influence” (Corrigan, 1995, p. 211). Regardless, the shared statistical methods across psychology today are ANOVAs and multiple regression.

SPECIFIC TECHNIQUES

¹ Standard deviation of 0.26.

² Students in quantitative psychology programs take 3.1 years of statistics and measurements courses, which brings the average up to 1.7 years.

In the *APA Publication Manual*, the APA provides the example of “multivariate analyses of variance, regression analyses, structural equation modeling analyses, and hierarchical linear modeling” (APA, 2010, p. 348), which we may take to be conventional with psychology. As the ANOVA and hierarchical linear modeling are both special cases of multiple regression, we will concatenate our brief discussion of those topics together.

Despite the fact that psychology ostensibly examines individual behavior, their methods are group-based. The most frequently used statistical technique, the ANOVA, “involves averaging across participants” (Vincente & Torenvliet, 2000, p. 250). Indeed, “without looking at each participant’s data individually, we do not know if the group average is representative of the behavior of the individuals” (Vincente & Torenvliet, 2000, p. 250); to infer individual behavior from group-level statistics is a form of the fallacy of composition. Structures which exist at one level of organization may not exist at another level.

NHST

The “nearly exclusive reliance of psychologists on significance testing” (Judd, McClelland, & Culhane, 1995, p. 437) is interesting, because the null hypothesis is (almost) never true (Vincente & Torenvliet, 2000, p. 260). In any experimental design with at least two groups, the different treatments *will* produce a different result. The question becomes: does the experimenter have enough statistical power to detect the effect size produced by the differing treatments?

Psychologists sometimes resort to running additional participants one at a time after the initial data-collection period in an effort to reach the desired power level and find a significant effect; a practice exacerbated because frequently “it seems that psychologists do significance testing with low power” (Rosnow & Rosenthal, 1989, p. 1277).

ROBUSTNESS

Psychologists are comfortable with their statistical tests, in part because “traditional wisdom asserts that parametric tests are robust with respect to departures from normality” (Judd, McClelland, & Culhane, 1995, p. 452). Additionally, traditional wisdom also asserts that “violation of the homogeneity of variance assumption in ANOVA [is] relatively unproblematic if there are an equal number of observations in the cells of an experimental design” (Judd, McClelland, & Culhane, 1995, p. 453). Furthermore, the existence of autocorrelation does “not (in general) affect the probability of detecting a nonexistent treatment effect” (Manolov, Solanas, Bulte, & Onghena, 2010, p. 198) (for larger), or a Type II error. The robustness of parametric tests is fortunate, because “in psychological data, assumptions of linearity, homoscedasticity, and normality are frequently unmet” (Oswald & Johnson, 1998, p. 165).

EXPERIMENTS

Experimental designs can draw a causal connection between inputs and outputs. For example, an experiment could be run examining the behavior of drivers in different automobile grades (e.g. cheap car vs. expensive car). If the experimenters find that people in expensive cars make fewer mistakes than people in cheap cars, they could conclude that expensive cars are safer to drive. A regression, looking at similar data, for example automobile accidents nationwide and classifying

the cars in accidents compared to the cars on the road, may also find that expensive cars are in less accidents. But without additional information, a number of explanations can be given to explain the results. Expensive cars are safer because people driving expensive cars have a higher sensitivity to risk; or people who tend to buy cheaper cars tend to drive in a more dangerous fashion. An experiment sharply reduces the number of possible explanations. Ideally, an experiment reduces the number of possible explanations to one. However, few practical experiments are ideal – there are both challenges in creating the design, and there are multiple threats to experimental validity.

Whereas construct validity is the extent to which a measure corresponds to the theoretical concept, experimental validity encompasses anything which could jeopardize a valid link between inputs and outputs; thus precluding a psychologist's ability to draw a causal connection.

Psychologists divide threats to validity into internal validity and external validity. A threat to internal validity is a confounding variable; psychologists stress eight categories of confounding variables: history, maturation, testing, instrumentation, regression to the mean, selection, mortality, treatment diffusion.

External validity, on the other hand, is the extent to which findings from research can be generalized. Psychologists concern themselves particularly with cross-cultural differences, and ecological validity.

INTERNAL VALIDITY

HISTORY

History refers to the history of the participant. A psychologist testing how different car types impact driving behavior would have their results thrown off if one of the participants was a professional driver, or perhaps had a psychological reaction to a certain brand of car (e.g. a dislike "Toyota" cars would probably result in worse driving i Toyota cars, independent of objective characteristics).

MATURATION

Maturation is the propensity of people to change during the experiment. If a psychologist uses a certain measure repeatedly during the experiment, the participant may get better over time – thus throwing the accuracy of the measure off.

TESTING

Testing conflates all possible errors with a test. A substantial threat to internal validity was identified by Orne (1962) called "demand characteristics." Orne explained that by agreeing to participate in an experiment, "the subject agrees to tolerate a considerable degree of discomfort, boredom, or actual pain, if required [...] just about any request which could conceivably be asked of the subject by a reputable investigator is legitimized by the quasi-magical phrase, "This is an experiment," and the shared assumption that a legitimate purpose will be served by the subject's behavior" (Orne M. T., 1962, p. 777).

Orne gave the example of running a test to determine an individual's willingness to continue a pointless task. He instructed participants to do a set of math problems on a piece of paper and then, when completed, to tear up the paper and do another set of math problems on a piece of paper. Ordinarily, people would do this perhaps once, or twice; but during an experiment, participants would continue for hours. One participant continued for six hours, and was only stopped because the experimenter wanted to go home.

In general, demand characteristics address the fact that participants want to cooperate with the experimenter; therefore, they are predisposed to do what the experimenter wants them to do. A substantial amount of information can be transmitted unconsciously. For example, experiments which test the effectiveness of a drug can be compromised if researchers know which group is expected to improve and which group is not – simply by interacting with participants, they can communicate this expectation and participants will respond correspondingly *independent* of the drug.

Demand characteristics have also been shown to affect non-human creatures such as rats; if identical (cloned) rats are divided into two groups, a “smart” group and a “dumb” group, and then timed as they navigate a maze, the “smart” group will perform better if the experimenters expect them to, and the “dumb” group will perform worse. The oft-cited example of non-human demand characteristics is the horse “Clever Hans” who could, ostensibly, perform relatively complex numerical tasks. However, since the horse could not speak, the answer was conveyed by tapping his hoof a number of times. Research concluded that Clever Hans would provide the right answer if (i) the questioner knew the right answer, and (ii) Clever Hans could see the questioner. Clever Hans was responding to small variations in body language – as he neared the correct answer, body language changed, which allowed him to stop at the correct answer.

Overall, demand characteristics are the “totality of cues and mutual expectations which inhere in a social context [...] which serve to influence the behavior and/or self-reported experience of the research receiver or patient” (Orne & Whitehouse, 2000, p. 469). Psychologists, obviously, devote considerable effort to ruling out the effect they could have individually.

INSTRUMENTATION

Instrumentation, the fourth threat to internal validity, conflates any problem with the experimental apparatus that may arise; for example, an eye-tracker malfunctioning sporadically.

REGRESSION TO THE MEAN

Regression to the mean refers to the fact that when tested multiple times, extreme scores – from the same people – will tend to move to the center of the distribution. Multiple tests within the same experiment can thus have confusing results.

SELECTION

Selection, the fifth threat, refers to the selection of participants and assigning them to conditions. Even beyond demand characteristics, since all participants are not the same ensuring that there are no systematic variations across conditions is necessary.

MORTALITY

Mortality refers to the tendency of people to drop out of the experiment, not – fortunately – the propensity of people to die during psychological experiments. If participants drop out of different conditions at different rates, the experiment will have misleading results.

DIFFUSION

Diffusion of treatment, the last foundation threat to internal validity, refers to the tendency of information about experiment to spread. Knowledge of conditions or intended results can alter the results.

EXTERNAL VALIDITY

External validity is the applicability of the results of the experiment to the wider world. External validity is generally separate into population-validity and ecological-validity.

POPULATION VALIDITY (SAMPLING)

Population validity refers to the ability to generalize the findings onto the larger population; that can only happen if the experiment's participants are a representative sample of the population. For instance, a journal editor notes that “one of the most frequent issues encountered with submissions to *Psychological Assessment* in this regard is the use of college students (an obvious sample of convenience) to answer questions about the structure of a test with clinical or referred samples or to test hypotheses about clinical applications of a test in the population at large” (Reynolds, 2010, p. 2). A substantial amount, if not most, of research psychology employs college students as their participants. However, psychologists generally try to claim that the results obtained from college students apply to non-college students as well.

CROSS-CULTURAL

Psychologists worry a great deal about cross-cultural validity. Research with people in the United States does not necessarily apply to people in Asia. One of the most famous examples occurred during the 1970s, when researchers concluded that there was a “Fundamental Attribution Error” people made. People in the United States – and Europe – tended to attribute performance at any one time to the individual, and not to the situation the individual was in. For example, people may conclude that when drunk college student ruined a garden, the college students were disrespectful vandals; instead of attributing their behavior to being drunk, with the understanding that their behavior would be different in a different situation. A social consequence of the Fundamental Attribution Error in America is the tendency of Americans to think that people who are wealthy are correspondingly more intelligent, hard-working, etc. However, when researchers performed the same experiment in Japan and other Asian countries, they found the reverse effect – people attributed behavior more to the situation than to the individual. Psychologists had to change their conclusion – that humans tended to attribute characteristics to individuals as a result of behavior – to a more general conclusion that simply identified the tendency to draw mistaken conclusions about people's behavior.

ECOLOGICAL VALIDITY

Coined by Ulric Neisser in 1976 (Goodwin, 1999, p. 419), ecological validity refers to the fact that the results obtained in the lab may be different. First of all, behavior in a controlled experiment may be substantially different than in the real world. The real world is uncontrolled – that is, there are many variables which could interact to produce a different result. Alternatively, phenomena which exist in the real world may not exist in the laboratory.

REACTIVITY

Phenomena which exist in the laboratory but not the real world are reactivity artifacts, where the participants are reacting to the laboratory conditions. One example is the Hawthorne effect, whereby “subjects’ knowledge that they are in an experiment modifies their behavior from what it would have been without the knowledge” (Adair, *The Hawthorne Effect: A Reconsideration of the Methodological Artifact*, 1984). Briefly, the Hawthorne effect was noticed during uncontrolled (field) experiments to increase productivity in a factor. A number of variables were studied; most dramatically, productivity was measure throughout the day as experimenters modified the amount of light available (from a candle). The field experiment began with the most light, and the experimenters steadily decreased the amount of light in the factory. However, productivity kept improving throughout the day, until the light was cut to the point where they simply could not see. The participants were not responding to the amount of light – they were responding to the fact that they were being observed at all.

NON-EXPERIMENTAL

Psychologists do engage in non-experimental, or descriptive, research, primarily of two kinds. The first is large-scale correlational research, which attempts to identify something worth studying in further detail. The second is case study research.

Case studies are used because there are things psychologists are interested in studying which simply do not occur very frequently. One example is the classic case of Phineas Gage. Phineas Gage was a railroad worker and was laying track when an explosion sent a rail spike into the underside of his jaw, and out through the top of his head, destroying most of his frontal cortex. He lived; but his behavior and responses were affected substantially. Psychologists were interested in identifying what changes his brain damage caused.

Clinical psychologists are in a similar position. They treat mentally abnormal people; case studies provide a way to describe the features of certain conditions which inform and may prompt further study. Note, however, that single-participant experiments have become increasingly common over the last two decades, so there may be a corresponding decline in case studies in favor of single-case designs. Part of the reason is because “case-study methodology has typically been relegated to a rather low level of scientific knowledge” (Kratochwill, 1992, p. 3) in psychology. Psychologists prefer to create knowledge with a high level of scientific knowledge and, if given the opportunity to do so, will.

Furthermore, it is not always possible to run an experiment. Case study methods are used within "clinical and other areas of applied psychology and which focus on outcome evaluation of specific intervention techniques" (Kratochwill, 1992, p. 4). There are no other participants to run in the experiment, the conditions are non-reproducible, and there are ethical implications beyond that.

JUSTIFICATION

JOURNALS

The unit of research in psychology, like most sciences, is the journal article. However, psychology is unlike other social sciences in that it has a clearly defined set of guidelines for writing papers. The guidelines are so influential that "it might be argued that all American psychologists [...] share at least two common educational experiences: a course in statistics and exposure to the *Publication Manual of the American Psychological Association*" (Madigan, Johnson, & Linton, 1995, p. 428). The APA style is regarded as a core component of the discipline. Not only is it required by nearly every psychological journal, but undergraduate students are also required to master APA style as part of their classes during their undergraduate career. It is illustrative that the three criteria the APA claims that "journal editors look for [are articles] that (a) contribute significantly to the content area covered by the journal, (b) communicate with clarity and conciseness, and (c) follow style guidelines" (APA, 2010, p. 226). The latter two are areas that the *APA Publication Manual* addresses.

APA STYLE

As psychology is rather fragmented and lacks a unified approach, "reporting standards are emergent and have not yet been developed for all types of studies" (APA, 2010, p. 22). Instead, "reporting standards are based on the research design and implementation of that study being reported" (APA, 2010, p. 22). The APA does not take a normative approach to methodology; its primary interest is in ensuring that the results are clearly communicated in a standardized fashion. Its approach is consistent with its understanding of psychology as cumulative; as psychology grows and develops, it will adopt new and superior methods. There is no reason to stifle methodology as long as the results are clear, and the work reproducible.

The APA recognizes five different kinds of journal articles: empirical study, literature review or meta-analysis, theory-orientated paper, methodological paper, or a case study (APA, 2010, pp. 26-27). Each type of article receives a somewhat different treatment; the most significant distinction is that the APA guidelines are modeled around an empirical study. The sections they suggest for empirical papers are "(a) the abstract; (b) the introduction of the research problem; (c) subsections of the method section describing the characteristics of the participants, sampling procedure, sample size, power, and precision; measures and covariates; and the general descriptor of the research design; (d) the statistical results; and (e) the discussion of the results" (APA, 2010, p. 22). As other types of journal articles do not have participants or results, certain sections may be left out.

Regardless, there are certain elements which pertain to all psychological research articles, which “includes the use of headings to effectively organize ideas within a study as well as seriation to highlight important items within sections” (APA, 2010, p. 62). As well as outlining what sections to include and what to include in each paper, the APA also delves into transitions, writing devices, tone, economy of expression, precision and clarity (colloquialisms, jargon, pronouns), comparisons, attribution, anthropomorphism, linguistic devices, bias, verb choice, adverb use, subordinate conjunctions, parallel construction, and grammar. (APA, 2010, pp. 65-86). The guidelines provided for language ensure that psychologists are tempted to use neither clever metaphors nor grand rhetorical techniques. The APA’s philosophy brings to mind to the famous *Dragnet* misquote, “Just the facts, ma’am.”

DATA ANALYSIS

The APA points out that “researchers in the field of psychology use numerous approaches to the analysis of data” (APA, 2010, p. 33) and adopt the non-normative stance that “no one approach is uniformly preferred as long as the method is appropriate to the research questions being asked and the nature of the data collected” (APA, 2010, p. 33). The appropriateness of the methods to the research question and data is a topic addressed, presumably, by the journal editor and peer reviewers.

However, there is little question that psychologists prefer papers with statistical analyses, to the point that excluding “a few notable journals, there are external pressures imposed by journal editors and reviewers to conduct statistical analyses of reported data – even when the analyses recommended or performed are not warranted, given the nature of the data” (Levin, 1992, p. 221). The APA notes that “historically, researchers in psychology have relied heavily on null hypothesis statistical significance testing” (APA, 2010, p. 33). Indeed, “for many PhD students [...] the 0.5 alpha level has acquired almost an ontological mystique” (Rosnow & Rosenthal, 1989, p. 1277). However, the APA takes pains to point out that “NHST is but a starting point and that additional reporting elements [...] are needed to convey the most complete meaning of the results” (APA, 2010, p. 33). The emphasis, of course, is on communicating all the empirical information necessary for a ‘complete’ understanding of the results. The purpose of a journal article is to convey the empirical results to the broader psychological community, such that they can become part of the ‘cumulative knowledge’ of the discipline. The APA does not mandate the use of certain methods, but it does insist that the reporting of those methods be complete.

DISCUSSION OF RESULTS

The APA instructs psychologists to address the external validity of their study. They recommend including “participant characteristics [which] can be important for understanding the nature of the sample and the degree to which results can be generalized” (APA, 2010, pp. 29-30) in the Methods section of the paper. It would, for example, be inappropriate to perform a study with American college students, and then attempt to apply those results to Asia.

Psychologists receive explicit instruction to “discuss the generalizability, or external validity, of the findings” (APA, 2010, p. 36) in the Discussion section of the paper. At a minimum,

psychologists should cover “(a) sources of potential bias and other threats to internal validity, (b) the imprecision of measures, (c) the overall number of tests or overlap among tests, (d) effect sizes observed, and (e) other limitations or weaknesses of the study” (APA, 2010, p. 35). In other words, all possible information that could affect validity.

EMBEDDED EPISTEMOLOGY

However, APA Style does more than just standardize the format for journal articles. It embodies a way of thinking; an epistemology of sorts (Madigan, Johnson, & Linton, 1995). The guidelines provided, and the justifications which serve to introduce them, depict a shared understanding of what psychology is and how it should be practiced. In learning APA style and “reading APA reports, a student learns how [...] her or his discipline constructs knowledge about the world” (Madigan, Johnson, & Linton, 1995, p. 430).

Part of the guide ensures that every psychological article reads in as similar a fashion as possible. It provides detailed instructions on both the structure and language of psychological research. The goal seems to be to reduce the variability of journal articles across psychology. As a consequence, “language in APA style takes on the function of a somewhat unimportant container for information about phenomena, data, and theories” (Madigan, Johnson, & Linton, 1995, p. 433).

A significant difference between APA Style and other disciplines “is the less frequent use of direct quotations” (Madigan, Johnson, & Linton, 1995, p. 433). The typical psychology article will have no direct quotations, despite having perhaps 40 citations. Instead, “previous work is often broadly summarized, or specific points are paraphrased” (Madigan, Johnson, & Linton, 1995, p. 433). Guidelines are not provided for paraphrasing; instead, it is “accepted that the language in which a particular point is expressed can be changed by a succession of writers, even though each cites the same original work” (Madigan, Johnson, & Linton, 1995, p. 433).

Furthermore, “one author is permitted to restate the findings of another in ways that support a new work” (Madigan, Johnson, & Linton, 1995, p. 433). As the APA style both dictates the information to provide in the results section, and de-emphasizes the influence of language, other psychologists are capable of explaining the research and results from one study – even in a way that contradicts the conclusions of that study.

NATURE OF SCIENCE

The *APA Publication Manual* assumes a particular view of the nature of science, which reflects and propagates the same view that most psychologists hold. In short, the APA advocates an view of psychology as an objective, cumulative science.

The APA claims that “in scientific writing, sound organizational structure is the key to clear, precise, and logical communication” (APA, 2010, p. 62). The APA’s claim assumes (i) that scientific writing is different from other kinds of writing, and (ii) that scientific writing should be unambiguous and logical. The APA implicitly assumes that science is objective – that is, embraces

ontological Realism, the belief that there is a single external reality which can be accessed through science. It also assumes that logic is essential; that science proceeds through logic.

The APA informs psychologists of the importance of references, because “citation of and specific credit to are signs of scientific and scholarly responsibility and are essential for the growth of a cumulative science” (APA, 2010, p. 28). The APA assumes that psychology is cumulative, and new research is integrated into old via citations. Indeed, citation growth has been growing in psychology. Since the 1970s, journal articles in psychology journals have substantially increased the number of citations (Adair & Vohra, 2003). The mean number of citations increased at least three-fold; and increase too large to be explained by “more prior literature to cite” (Adair & Vohra, 2003, p. 17), and substantially more than either physics or biology. The age of references also changed. In the 1970s, 40-60% of references were to sources within five years of the publication date. That percentage “declined by approximately one third” (Adair & Vohra, 2003, p. 18) by the end of the century. As psychology builds its stock of knowledge, psychologists reference earlier studies to a greater extent. This view is further supported by the practice of the *APA Publication Manual* to de-emphasize the variability of language, and correspondingly increase the relative emphasis on the empirical results.

The APA also encourages psychologists to include “enough statistical information to allow [the paper’s] inclusion in future meta-analyses” (APA, 2010, p. 34) in their results sections. This practice will enable their work to “more easily become a part of the cumulative knowledge of the field” (APA, 2010, p. 34).

The assumptions underlying the *APA Publication Manual* include ontological commitments about the nature of the world, the belief that psychology is cumulative, and an understanding of how knowledge is constructed and developed in psychology. Collectively, these assumptions constitute an epistemological framework for psychology. Sub-discipline in psychology may modify this epistemology, but it is likely that most psychologists accept the epistemological beliefs embedded in the publication manual.

WHO PARTICIPATES?

Psychology paper are peer-reviewed. Referees examine papers for mistakes and, more importantly, for substantive contributions to the field. In the absence of methodological issues, “the value of research endeavors not only depends on its internal validity, but also its ability to address important life problems” (Corrigan, 1995, p. 212). Psychologists have turned to external – and practical – criteria to evaluate new psychological research. Editors are more likely to publish such articles than replications of existing studies; despite the “importance of replication, a concept to which psychological journal editors, textbook writers, and researchers pay considerable lip service” (Rosnow & Rosenthal, 1989, p. 1280), journal articles do not publish replications of existing studies (Rosnow & Rosenthal, 1989, p. 1280). Instead, psychology employs meta-analyses, which is one of the reasons the APA guidelines emphasize the importance of providing enough information to be included in the meta-analyses.

The referees for journal articles are professional psychologists. The APA explains “psychology is a doctoral-level profession;” indeed, psychologists must legally be certified before they can practice as psychologists, and that certification requires graduate training. In fact, “on July 28, 1977, the state of Missouri passed a psychology licensing law, the last of the 50 states to do so” (Benjamin, Jr., 2001, p. 738). Besides certification, “most independent academic and professional positions in psychology in the United States require a doctoral degree” (Rosenzweig, 1991, p. 17).

Practicing psychologists, whether they work in research or applied psychology, pass through the doctoral program. As outlined earlier in the paper, the education graduate psychologists receive is largely unstructured, and is unified only by a few methods classes. Psychology has a number of independent specialties, and consequently “the reward structure in psychology [...] is such to foster narrow specialization and a lack of integration. If one peruses advertisements for academic positions, one finds many for specialty areas such as cognitive psychology, social psychology, and behavioral neuroscience. What are rare are jobs for general psychologists...” (Dewbury, 2009, p. 285). The fragmentation of psychology means that the referees chosen by a journal editor are typically in the same specialty as the publishing psychologist; they do not perform cross-specialty evaluations.

CONCLUSION

Psychology is highly fragmented, unified primarily by its shared philosophical perspective. However, the APA also unifies psychology through its publication manual³. The APA guidelines unify the presentation of psychological information and, in doing so, implicitly advocates epistemological assumptions about how science, and psychology in general, functions. The unifying forces of the APA and the shared philosophical perspective tie psychology together.

However, the fragmentation of psychology still has an impact on its verification process. Referees specialize in a certain area, and they are asked to review papers in that area. The fragmentation of psychology, and the lack of a unifying theory, means that each additional item of research is evaluated ad-hoc, by people involved in the same topic. The methods psychologists in certain disciplines, while influenced by their time at graduate school, are focused within their specialty. Successful methods are published, and published methods are emulated, implying that psychology may experience methodological drift.

Regardless, the ability of psychology to run controlled experiments substantially minimizes the tendency for methodological drift. Experiments are the preferred method of testing knowledge, as they dramatically minimize the number of possible confounding variables. Psychologists therefore focus on challenges to the validity of the experiments they do run, as opposed to

³ The APA guidelines present such a unified front that when during a 300-level psychology course the material shifted to articles published in education journals, the instructor spent a few minutes warning students that the presentation was difficult and it may impede comprehension.

developing new techniques for analyzing data. Indeed, psychologists place a far greater emphasis on challenges to validity than the other social sciences.

Fragmentation in psychology is limited by the efforts of the APA, and by their post-Behaviorist philosophy. The consequence is that psychology, while divided, produces research easily distinguishable from other social sciences, and which bears more in common with other research in psychology than with research in the other social sciences.

ECONOMICS

INTRODUCTION

Economics is a social science unified by theory but divided by different approaches to how that theory is applied. As with other social sciences, economics develops knowledge through data acquisition, measurement and analysis of that data against economic theory and subsequent justification and validation of the resulting knowledge.

The definition of economics seems fairly straightforward. The AEA defines economics as “the study of how people choose to use resources” (AEA, 2009). Additionally, the APA (2009) reports that economics has twenty major subfields, and substantially more specialized practices categorized under those subfields. Each field specializes on an aspect of interest, such as Labor Economics or Agricultural Economics. The specialties are best regarded as applications of economic theory.

Economics has a dominant theoretical tradition: neoclassical economics. While neoclassical economics is facing increasing challenges, and there is some evidence that the mainstream is moving away from neoclassical foundations (Colander, Holt, & Rosser, 2003), it remains the dominant theoretical tradition in economics, and continues to influence the epistemology of the discipline.

NEOCLASSICAL ECONOMICS

Neoclassical economics is a formalistic-deductive framework (Lawson, 2006, p. 489). It is descended from John Stuart Mill’s deductivist account of economic science (Viskovatoff, 2003). Mill claimed that science was deductive, thus economics needed to be deductive in order to be scientific; empirical work was only useful to establish the assumptions behind the theory in the first place. According to Mill, specifying a set of assumptions as axioms, one could construct a useful economic science.

There are three assumptions which underlie neoclassical economics: methodological individualism, maximization, and equilibrium. Methodological individualism, a term coined by Joseph Schumpeter, refers to the concept that “the individual in the economy or in the society is like the atom in chemistry: whatever happens can ultimately be described exhaustively in terms of the individuals involved” (Arrow, 1994, p. 3). Indeed, the belief that the “choice calculus of the individual, as opposed to the group, is at the heart of the economist’s view of the world” (McKenzie, 1977, p. 5), Tony Lawson points out that employing deductive logic on such axiom implicitly requires individuals to “exercise their own separate, independent, and invariable [...] effects” (Lawson, 2006, p. 494); that is, individuals do not react in response to other people, and they do not randomly change their minds.

Maximization is the understanding that individuals always “maximiz[e] subject to constraints” (Ekelund Jr. & Herbert, 2002, p. 206). In economic terms, people “try to choose the best patterns of consumption that they can afford” (Varian, 2005, p. 3). Embedded within the assumption that the atomistic individuals are maximizing is that they are maximizing with respect to *price*. Economics holds that suppliers and consumers engage in a market and exchange products at a mutually agreeable price. It can be shown, deductively, that if both parties maximize subject to their price constraints the market will be efficient. Individuals maximizing something *other* than price will be seen as irrational within the context of the neoclassical system.

The equilibrium principle claims that “[p]rices adjust until the amount that people demand of something is equal to the amount that is supplied” (Varian, 2005, p. 3). While the concept of equilibrium can be defined a number of different ways within economics (Backhouse, 2004), the most encompassing definition is “equilibrium as the absence of endogenous tendencies for change” (Backhouse, 2004, p. 296). If all individuals in the system are maximizing and make rational choices, then at some point the cumulative effect of all the choices should lead to a situation where no one individual has the incentive to change the status quo.

Neoclassical economics employs these principles as axioms from which to deductively construct theory. These claims can be viewed as ontological commitments to reality; neoclassical economics would not welcome any research which threatened to challenge the sanctity of those axioms. Unfortunately, neoclassical economics has faced serious challenges over the past fifty years. Rizvi (2007) documents the repeated challenges neoclassical economics faced after the second world war. While it repeatedly overcame those challenges by leveraging its deductive method, it modified previously ironclad assumptions. Tony Lawson acknowledges the continual changes and argues that the assumptions of neoclassical economics are not the defining feature of the discipline; instead, the distinguishing feature of “modern mainstream economics is just the reliance on certain forms of mathematical (deductivist) method [...] seemingly the only [enduring feature] [...] and [...] the] essential core” (Lawson, 2006, p. 489). The defining feature of neoclassical economics is the deductive method it employs, which also sets it apart from the other social sciences.

MICRO/MACRO SPLIT

Economic analysis can be divided into micro- and macroeconomics; microeconomics examines the exchange behavior of individual actors, whereas macroeconomics examines the behavior of individuals in aggregate.

The essentials of macroeconomics “lie in the interactions among goods, labor, and asset markets of the economy and in the interactions among national economies that trade with each other” (Dornbusch, Fischer, & Startz, 2004, p. 3). A microeconomic examination takes one market in the economy – such as the labor market – and examines the internal dynamics in isolation of the other markets. A macroeconomic analysis is unconcerned with the internal dynamics in the labor

market, but is concerned with how the overall market will change in responses to other markets – as a crude example, to increasing asset prices such as housing.

One of the precepts of neoclassical economics is that macroeconomic behaviors proceed from microeconomic behaviors. Consequently, neoclassical macroeconomics inherits the assumptions of neoclassical microeconomics. Ideally, “macroeconomic relationships should be derived from profit-maximizing by firms and from utility-maximizing by consumers with economic arguments in their utility functions” (Akerlof, 2007, p. 3). The need for neoclassical economics to be able to explain macroeconomics in terms of microeconomics means that “many of the major developments within general equilibrium macroeconomics over the last thirty years can be seen as an attempt to develop a consistent micro-macro system” (Dow, 1996, p. 70). Economists have attempted to create a unified economic theory that does not differentiate between individual exchange and aggregate exchange.

Microeconomics is more settled than macroeconomics. Manfred Gartner examined the material taught in intermediate courses to undergraduates in Europe. At the undergraduate level, we would expect there to be broad similarities in the education European students receive to what students in the United States receive. Gartner found that “microeconomics appears to be more homogenous and more settled than macroeconomics” (Gartner, 2001, p. 226), in part because both the textbooks employed in courses and the material in the textbooks has remained relatively unchanged in microeconomics. Textbooks should “distill the core of the cannon for the teaching of new generations” (Hoamouda, 2002, p. 65); thus, a stable canon would be reflected by unchanging textbooks. In microeconomics, Hal Varian’s *Intermediate Microeconomics* textbook is used by 40% of European universities; and “today’s students are exposed to well over 90 percent (actually close to everything) of what students could learn from the first edition.” (Gartner, 2001, p. 226). Macroeconomics is not as unified. There is a far greater diversity of textbooks employed; the most popular book has only 19% share, nearly indistinguishable from the second and third most popular, with 18% and 17% respectively. Varian’s microeconomic textbook, on the other hand, holds 40% of the market with its nearest contender at 7%. Furthermore, the material contained in those textbooks varies. Of the top five macroeconomic textbooks, which account for 76% of the market, three offer Keynesian-rooted macroeconomic, one develops from micro foundations, and one offers a somewhat balanced approach (Gartner, 2001, p. 225). Additionally, the coverage of the material in macroeconomic courses is not universal; no topic is covered in all universities. The topic with the most coverage, national income accounting, is covered in 95.5%; the top four topics in microeconomics are above 97 percent. It may be more instructive to note that the average coverage⁴ of macroeconomic topics identified by Gartner is 58%, whereas the average coverage of microeconomic topics is 76%.

⁴ Note that the bottom 20% of both categories was excluded as they were outliers.

MEASUREMENT

Economists “make their living by studying those phenomena which are defined, for a given time and space, as economic” (Caldwell, 1980, p. 60). Naturally, “the phenomena which have been defined as economic have changed through time” (Caldwell, 1980, p. 73) because the measurement is a directed action concerned with measuring phenomena to which economics has ontological commitments.

DATA TYPES

While “economic data sets come in a variety of types” (Wooldridge, 2002, p. 5), there are three basic types of economic data which are “the most common types of data structures that are used in applied econometrics” (p. 18): cross-sectional data, time-series data, and panel data. Cross-sectional data consists, for instance, of “a sample of individuals, households, firms, cities, states, countries, or a variety of other units, taken at a given point in time” (p. 6). Time series data comprises “observations on a variable or several variables over time” (p. 8). Economists may use “stock prices, money supply, consumer price index, gross domestic product, annual homicide rates, and automobile sales figures” (p. 8), all of which are forms of time series data because they are collected over time. Panel data, also known as longitudinal data, is a “time series for *each* cross-sectional member in the data set” (p. 10). Examples include “wage, education, and employment history for a set of individuals followed over a ten-year period [... or] data for the same set of counties in the United States on immigration flows, tax rates, wage rates, government expenditures, etc., for the years 1980, 1985, and 1990” (p. 10). It is important to note that economists typically assume that cross-sectional and time series data are essentially randomly sampled from an underlying population. Cross-sectional data is assumed to be randomly selected (p. 6) because the individuals represented in the sample are thought to be randomly selected; time series data because each data point is thought to be “one possible outcome, or *realization*, of the stochastic process” (p. 312). Panel data, of course, inherits both assumptions.

In general, ‘economic data’ amounts to things pertaining to the economy, or which can be represented as an economic system. Micro- and macroeconomics employ different data. As microeconomics studies markets and how the agents within markets interact, the data originates largely from individual-level statistics about exchanges involving companies, consumers, prices, etc. Macroeconomics, on the other hand, studies national-level economics; the interaction of all markets in the ‘economy’ which is most frequently taken to be the nation. International economics is a branch of macroeconomics, and concerns itself with interactions between national economies. The data for macroeconomics therefore is typically aggregate in nature; the sum of all transactions in the national economy (GDP) and so on.

There are two sources of measurement error in economics. The first is data collection error, and the second is incongruity between the data collected and the concept the economist wishes to measure (Spanos, 2006, p. 36).

Economics understands that “many variables used in econometric analyses are recorded with error. These errors may have occurred at various stages of the data collection. They may be the result of misreporting by subjects, miscoding by the collectors, or incorrect transformation from initial reports into a form ready for analysis” (Hyslop & Imbens, 2001, p. 475).

Where possible, economists attempt to correct for these errors. Correction occurs when economists notice a bias, or a consistent error, in the measurement – for example, from miscoding or an incorrect transformation. Other errors are typically ignored (Hyslop & Imbens, 2001, p. 475), because the error is “assumed to be ‘classical measurement error’, in which the error is independent, or at least uncorrelated with, the true value of the underlying variable” (Hyslop & Imbens, 2001, p. 475).

Formally, the classical conception of measurement error “assumes that the measurement error is independent of the true value [which] implies [that] $E[e|X^*] = 0$ ” (Hyslop & Imbens, 2001, p. 476). If the error is random with an average of zero, then sufficiently large samples will ensure that the error effectively cancels itself out. Uncorrelated, randomly distributed data should not affect the validity of economic analysis.

CONCEPTUAL INCONGRUENCE

The degree to which economic measures correspond to economic theory is a concern in economics. However, Fiona MacPhail (1998) has documented how the “general methodological discussions of [...] validity, or systematic discussion of validity theory in which types of validity are defined and evaluated, do not occur within Economics” (MacPhail, 1998, p. 119). Despite the lack of formal dialogue on the subject, she points out that economists are in fact concerned with validity, or conceptual congruence.

In 1947, Tjalling Koopmans argued that measurement needed to proceed from economic theory. He claimed that “utilization of the concepts and hypotheses of economic theory [...] as a part of the processes of observation and measurement [is] perhaps [...] the only possible road” (Koopmans, 1947, p. 162) to obtain useful data. Koopmans point, however, as more general. He argued that since economic concepts are defined by economic theory, the only means to obtain data which accurately reflected the concept was to define the concept and then collect the data. Economic concepts are not necessarily directly accessible. Frequently, economists employ theories where the outcome is directly observable – the price when a product is exchanged – but the internal workings that generated the outcome are not. Simply collecting data and then using that data to provide empirical support to a theory does not guarantee that the data is up for the task. Koopmans therefore stresses that economists need to determine that the “best use has been made of available data in relation to the most important aspects of the phenomena studied” (Koopmans, 1947, p. 164). Nearly sixty years later, econometrician Aris Spanos points out that since “the overwhelming majority of economic data are collected by government agencies and

private institutions, not the modelers themselves” (Spanos, *Econometrics in Retrospect and Prospect*, 2006, p. 13), there is the potential that the collected data will not match up to the economic concept under examination.

MacPhail (1998) points out that economists reach agreements about the validity of measures with respect to economic theory (p. 137). While economists tend to “view economic estimates as ‘objective’ facts about the economy” (MacPhail, 1998, p. 137), they do so within the shared mainstream of economic theory. The ‘objectivity’ of economic measures in fact operates in reference to economic theory, but because economic theory has a unified mainstream the context of the validity is clear.

There are two types of measures economists employ, with respect to conceptual congruence. First of all, if an economic concept is not directly available, economics will employ a proxy for their concept. Alternatively, economists will collect multiple variables, each of which corresponds to the concept to some extent, and construct an index.

RELATED MEASURES

Economists work around their inability to directly access certain economic concepts by relying on other measures which, if they are not a unmediated result of the concept, are at least highly correlated. For example, Alan Greenspan employed the sales of men’s underwear as a bellwether for the overall economy, particularly during a recession (Greenspan, 2007). Sales of men’s underwear does not measure the overall economy, but one can reasonably expect them to be related. A significant decline in men’s underwear does not indicate that men are wearing less underwear, but that they are cutting back on non-essential expenditures. A resurgence in demand for men’s underwear can then be highly correlated, and be a leading indicator for, a resurgence of the economy as men enter the workforce and, one supposes, have reason to purchase new underwear.

INDICES

Since certain economic concepts are not directly accessible – amount of innovation, quality of life, even happiness – economists construct indices which approximate the desired concept. An index is a number of directly observable variables, each of which relates to a theoretical concept, and combine them in an effort to measure the concept more accurately. For example, the Consumer Price Index (CPI) is frequently used as a cost-of-living index. Specifically, it measures the “average change in prices over time of goods and services purchased by households” (Bureau of Labor Statistics, 2010). The Bureau of Labor Statistics collects “prices of food, clothing, shelter, and fuels, transportation fares, charges for doctors’ and dentists’ services, drugs, and other goods and services that people buy for day-to-day living” (Bureau of Labor Statistics, 2010) every month and averages the price changes with “weights [that] represent their importance in the spending of the appropriate population group” (Bureau of Labor Statistics, 2010). Broadly speaking, the CPI reflects price changes in the products people buy. However, while the CPI is certainly a *better* indicator for cost-of-living than, for example, average household income in a region, but it may

not necessarily line up with the economic concept. A cost-of-living index should also take into account quality of life (Deaton, 1998), since a cost-of-living applies at a certain quality of life. It is more accurate to say that the CPI measures variations in household spending; it does not measure cost-of-living changes. An individual may – theoretically – increase their quality of life by purchasing more products. However, households are necessarily bounded by their income, and can only obtain a certain quality of life, measure by products purchased. An index which reflects changes in the cost-of-living also needs to take into account changes in the quality of life; if new products lower the cost-of-living at a certain quality of life, then the real wealth of households increases. Therefore, the weights in the CPI need to be modified from time to time to take into account the fact that new products may provide more marginal quality of life than the products they replace. Unfortunately, disambiguating changes in taste which do not improve quality of life, and product adoption which does improve quality of life, is arguably impossible (Deaton, 1998). An additional problem is that there are no other measures to which it should correspond, so there is no way to approximate changes in accuracy as the measure changes (Deaton, 1998). An index can more accurately represent an underlying economic concept, but it remains indirect and may not match up to the desired economic concept.

METHODOLOGY

Economics employs both a deductive and an inductive method. The deductive method carries more weight and: it is possible to have a paper without empirical data, but it is impossible to have a paper with deductive reasoning tying it to economic theory.

The deductive method has “been the dominating modeling perspective in economics for almost two centuries” (Spanos, 2009, p. 3), ever since John Stuart Mill laid out his deductivist methodology in 1836 (Viskovatoff, 2003, p. 398). Consider the “five separate neutrality results overturned aspects of macroeconomics that Keynesians had previously considered incontestable” (Akerlof, 2007, p. 3). The neutralities are: “the independence of consumption and current income [...]; the irrelevance of current profits to investment spending [...]; the long-run independence of inflation and unemployment [...]; the inability of monetary policy to stabilize output [...]; and the irrelevance of taxes and budget deficits to consumption (Ricardian equivalence)” (Akerlof, 2007, p. 3). The conclusions arose because economists deduced, from the principles of neoclassical economics, some of the impacts on the macroeconomic. Each conclusion was not only published, but had tremendous influence over the discipline, while employing solely the deductive method.

The inductive component of economic methodology is called econometrics, and acts in a “vital yet subservient position in economics epistemic culture” (Yonay & Breslau, 2006, p. 376). The deductive component is predominant. Econometrics “has evolved as a separate discipline from mathematical statistics because the former focuses on the problems inherent in collecting and analyzing non-experimental economic data” (Wooldridge, 2002, p. 2). The focus on non-experimental data is important, because very little economic data can be collected in controlled experiments, particularly in macroeconomics. Wooldridge points out that “it is often impossible,

prohibitively expensive, or morally repugnant to conduct the kinds of controlled experiments that would be needed to address economic issues” (Wooldridge, 2002, p. 2); in short, “[you] almost never have a controlled experiment in economics” (Gelman & Cortina, 2007, p. 99). Economists must take data as given, and their methods reflect that.

In models, “variables can be endogenous, exogenous, or predetermined” (Gelman & Cortina, 2007, p. 104). An endogenous variable is one internal to the model – in other words, one you’re attempting to predict or explain. An exogenous variable is one external to the model. A predetermined variable is also external to the model, but the difference is that a “predetermined variable has a history that is unrelated to your mistakes, but an exogenous variable has both a history and a future unrelated to your mistakes” (Gelman & Cortina, 2007, p. 105).

For econometricians, “theories are made empirically testable by constructing models of our theories” (Boland, 1989, p. 137). Economists begin with “set of assumptions, then draw logical conclusions for a particular application” (Mackie, 1998, p. 116). Economists can then either adopt Karl Popper’s approach of testing the conclusions, or they create an economic model and then “instantiate [... them] by quantifying” (Spanos, 2009, p. 3) with respect to the data.

Varian describes the conventional view that “economics proceeds by developing models of social phenomena. By a model we mean a simplified representation of reality” (Varian, *Intermediate Micro Economics*, 2005, p. 1). The belief is that a “model’s power stems from the elimination of irrelevant detail, which allows the economist to focus on the essential features of the economic reality he or she is attempting to understand” (Varian, 2005, p. 2). Economists try to “adopt the simplest model that is capable of describing the economic situation we are examining” (Varian, 2005, p. 2). The understanding of how to construct the model – what defines the economic situation, what is capable of describing it – comes from neoclassical economic theory. Economists can ‘calibrate’ deductively-derived models with respect to the data, and provide predictions or policy recommendations based on the calibrated model (Wooldridge, 2002, p. 18)..

Econometric methods can “simulate a *ceteris paribus* experiment” (Wooldridge, 2002, p. 14) since the “exogenous variables are conveniently impounded in *ceteris paribus*” (Tarascio & Caldwell, 1979, p. 987). The *ceteris paribus* clause, or the error term, includes “(i) approximation errors, (ii) omitted factors, (iii) variability in human behavior, (iv) aggregation errors, and (v) errors of measurement” (Spanos, 2006, p. 31). In other words, everything that could contain error. The results of the model should then hold true as long as nothing in the error term changes.

Models are critical in economic theory because, partly due to the *ceteris paribus* clause, there are no constants in econometrics (Yeager, 1957). Relationships determined via empirical methods hold true *ceteris paribus*, but changes will occur which alter the size of the relationships – the parameter values. The deductively-derived model allows economists to create a model with more explanatory power than attempting to create an inductive theory. As a consequence to the continually changing parameter values, Robert Lucas (1976) pointed out that economic forecasting was, at best, prone to error and at worst outright impossible. The issue is that any

change in behavior would “systematically alter the structure of econometric models” (Lucas, Jr., 1976, p. 41); changes could come from policy changes by governments, or simply economic agents knowing the forecast. At the most trivial level, a forecast of a liquidity shortage leading to a bank run could become a self-fulfilling prophecy. More complicated issues involve confounding variables; for instance a policy change may shift a variable from having a negligible impact on the examined outcome to having a substantial confounding impact.

The most significant issue econometricians deal with is the identification problem. The identification problem is the issue of determining whether “equation fitted to data is actually the equation one wants, rather than a different equation” (Christ, 1994, p. 31). Most econometric equations are members of a set of simultaneous equations. However, because all equations can change simultaneously, “the parameters of the model cannot logically be inferred on the basis of empirical data alone” (Fisher, 1966, p. 1). The solution is to rely on “*a priori* information [...] either from economic theory or from the results of other studies” (Fisher, 1966, p. 1). Economic theory is essential to econometrics to determine what the parameter should be, given the empirical data.

JUSTIFICATION

Economics is similar to most other academic disciplines in that “economic knowledge is now disseminated primarily through a journal-dominated system” (Medoff, 2003, p. 425). The journal system is peer-reviewed.

Economists have acknowledged that there are no ‘objective’ sources of justification. Donald McCloskey argues that “economists do not follow the laws of enquiry their methodologies lay down” (McCloskey, 1983, p. 482). It is “common claim that prediction is the defining feature of a real science, and that economics possesses the feature, is [...] open to doubt” (McCloskey, 1983, p. 487). He points out that an objective criteria for evaluation – and thus justification – would presuppose “methodological legislation;” the ability to define (or at least identify) the perfect method for each course of study. Justification would then reduce to evaluating the method: determining whether its application was suitable, identifying mistakes (if any) in the application of the method, and verifying that the results support the claims. In other words, the task would be possible without any significant knowledge about economic literature – and could be done without comparison to other theories.

However, the objective factors in a theory or paper are “hardly more than a necessary prerequisite for an acceptance of theories” (Tarascio & Caldwell, 1979, p. 999). Few economists, knowing that there is a fault in the paper, will accept it as true. Indeed, Tarascio and Caldwell point out that “the more technically orientated a discipline [...] the less important [...] these prerequisites [are]” (p. 999) because accuracy is taken for granted. Technical accuracy is certainly important, but it cannot be the deciding factor for research.

Furthermore, a number of economists (Spanos, 2009) have pointed out that there is a difference between statistical significance and substantive significance. Substantive significance refers to the

impact it has on economic theory. The work may be statistically significant, but of no substantive value because it merely re-creates some theory already known. In econometric modeling, a “research paper may be ‘technically correct’ and at the same time lack significance” (Tarascio & Caldwell, 1979, p. 998); statistical significance is necessary but not sufficient. A work must also be of some substantive value to economic theory. Substantive significant must be evaluated with respect to the larger economic corpus.

Consequently, the criteria the peer evaluators – referees – use is highly subjective, and may include “originality, novelty, creativity, innovativeness, advances in existing economic knowledge, and relevance to real economic problems” (Medoff, 2003, pp. 425-426). As noted, the firmer the technical foundations of a discipline like economics, “the less important are these [objective] prerequisites” (Tarascio & Caldwell, 1979, p. 999). The vast majority of papers evaluated will be accurate statistically, and thus their evaluation must reduce to entirely subjective components – relevance, novelty, consistency with the existing economic paradigm.

A survey of 52 referees from leading economics journals (Mackie, 1998) sheds light on some of their criteria for approval. According to the survey, over 50% of the respondents claimed novelty was important – ideas, methods, new (empirical) results, new data, etc. On the other hand, 32% of respondents indicated that conformity to existing literature was important. For the rejected journals, the referees most commonly cited attributes such as “the article produces no new insights; it is poorly written; or, it is not interesting, is of low quality, contains insignificant results” (Mackie, 1998, p. 101).

Indeed, Robert May, who has produced notable work in chaos theory, submitted a paper to *Econometrica* and received an evaluation which claimed that “the paper’s findings ‘were well-known and not interesting’” (Gans & Sheperd, 1994, p. 172). He subsequently published a paper incorporating the same findings in *Nature*, which “remains [...] the most cited paper in the field of ‘chaos,’ which currently is going for 2,000 citations” (p. 172). Indeed, nearly all prominent economists who publish in journals “have suffered rejection, often frequently” (p. 165); in some areas, important papers are often rejected. According to Gans and Sheperd, “important articles in the international economics field have been rejected with regularity” (p. 168). As there is no objective criteria by which to measure articles, peer reviewers must resort to subjective criteria given their own preferences. However, given the mass of literature that can be counted as the economic corpus, “no individual researcher is able to ‘absorb’ completely the contents of the existing literature, past or present. Instead, he picks and chooses according to his own impression as to what is important and useful for his purpose” (Tarascio & Caldwell, 1979, p. 996). The evaluation is thus subjective, but informed; ideally, papers which are not worth reading are kept out of journals.

STRUCTURE

Economics has become increasingly mathematical since the middle of the 20th century. For instance, in 1940 under 3 percent of pages in the *American Economic Review* included mathematical expressions. However, in 1990 nearly 40 percent of the pages held mathematics –

and more complicated mathematics (Debreu, 1991, p. 1). Another metric is that, amongst the 13 American economic departments labeled “strong” or better, 1 percent were members of the Econometric Society in 1940. In 1990, that percentage has increased to nearly 50 percent. Furthermore, of the 30 Nobel prizes given between 1969 and 1990, 25 were to members of the Econometric Society. As econometrics requires a considerably mathematical background, these measures can be taken to indicate that the mainstream of economics has become considerably more mathematical – and doubtless more mathematical still, since the improvements in computers make it dramatically easier to run more and more sophisticated analyses. Of course, these analyses may require less of economists; tools such as SPSS make running regressions a matter of pushing a few buttons as opposed to actually understanding the underlying mathematical operations.

The explosion of mathematics in economics means that nearly every economic paper published must have some kind of mathematical model. Of course, just because all economic papers have mathematical models it does not necessarily follow that they have empirical – that is to say, econometric – evidence. Models do not need to be ‘fitted’ to real-world data in modern economic papers. The rationale for this practice is that economists can (i) more clearly express their point if you convey it in the less ambiguous mathematical form, and (ii) it is possible to derive substantive implications from previously published research or modifications thereof; e.g. producing a mathematical model of bounded rationality. If the bulk of economic papers published have mathematical models, it becomes considerably easier to extend, modify, or refute the model with your own model.

As a consequence, while a mathematical model is not a prerequisite to getting published in economics, papers lacking mathematical models may be taken less seriously. Given the research by Tarascio and Caldwell (1979), papers lacking technical attributes may be rejected out of hand – that is, economists may see highly technical work as a proxy for the depth of thought in a paper, and thus ignore papers lacking that degree of mathematics. Either way, a great deal of mathematical training is necessary to decode modern economic literature, which limits the number of people inclined to or capable of reach economic articles.

WHO PARTICIPATES?

The people who read journals are “predominantly professional academic economists” (Medoff, 2003, p. 425). Economists read journals to keep up with the current literature – after all, if they do a study which has already been done, chances are that it’ll be rejected from a journal – and for news ideas in their own research. Academic economists have a substantial incentive to publish in journals, and thus keep up with the existing literature; publication in journals is “a necessary condition for tenure, promotion, influence, reputation, and mobility” (Medoff, 2003, p. 425).

Additionally, most economists work at university. In a survey of economic graduate students, the authors found that “the academic jobs the students desired were primarily at research institutions” (Colander & Klammer, *The Making of an Economist*, 1987, p. 97). Indeed, “forty-one

percent wanted to be at a major university 15 years from now, 32 percent at a policy oriented research institute, 16 percent at a good liberal arts college, 11 percent at a major research institute, and 9 percent in the private sector” (Colander & Klamer, *The Making of an Economist*, 1987, p. 97). In other words, 9 percent of graduate students wanted to abandon research and go into business, and 16 percent wanted to teach economics. In contrast, 84 percent of graduate students wanted to pursue some sort of research position.⁵ Perhaps the drive to work in research is driven in part by the socializing effects of graduate school and the contempt paid to non-research positions; one student in the survey said “that’s definitely not the thing to do-to walk into [a well-known professor’s] office and announce that you want to teach at [a major liberal arts college].” (Colander & Klamer, *The Making of an Economist*, 1987, p. 97). Graduating economists tend to fulfill their ambitions; over 78 percent of members of the American Economic Association work predominantly in teaching or research and development (Scott & Siegfried, 2002, p. 530). Research institutions are socially desirable for graduate students; perhaps because academic success is defined in part by publications, and the entire point of research institutions is to create (and publish) research. That is, economists working for research institutions – particularly the ‘pure’ research institutions and not the ‘applied’ policy-research institutions – will publish more articles, and thus be more successful (Medoff, 2003, p. 425). Other institutions have no incentive to publish in the major journals. Policy research institutions do not aim to produce advances in economic theory, but rather apply existing economic theory to evaluate different policy options. Liberal arts colleges, similarly, place more of an emphasis on educating their students than on research. And, of course, economists who enter the private sphere are most likely performing applied work that is only relevant to the corporation they are working for. A graduate education is a prerequisite for participating in economics, and most individual who attend graduate school would like to work in research.

CONCLUSION

Economics places a strong emphasis on deductive methods, distinguishing it from the other social sciences. This emphasis on deductive methods reduces the importance of inductive, or empirical, methods; econometrics is more frequently used to calibrate derived models of the economy than to investigate how the economy works. As a consequence of economics’ deductive method, the most significant source of error is construct validity, or conceptual incongruence. Economics makes certain assumptions about how the economy is constituted, and those fundamental assumptions may be wrong; regardless, due to the inaccessible nature of social phenomena, it is quite possible for a nonexistent feature to be measured.

A seeming consequence of the deductive method in economics has been the degree of formalization in economics. Formalizing economic theories makes it easier to demonstrate how they were derived, and to either compare them to existing theories or extend them in some other fashion. Deduction is naturally a logical procedure – both logic and mathematics, which itself

⁵ The percentages don’t add up to 100% because some students chose multiple goals.

utilizes first-order predicate logic, are deductive – and thus there is no surprise that a predominantly deductive discipline would place an emphasis on formalization.

Still, regardless of the deductive and formal nature of economics, the criteria employed by referees is subjective. A paper may be rejected for not contributing to economic knowledge, failing to be novel, and so on. However, since economics has a unified theory to which disciplines contribute, the importance of matching existing theory or demonstrating novel methods is increased. New research is judged with respect to how well it adheres to theory, and how much it extends the theory. While other subjective criteria also play a significant role, the degree to which economists judge papers in terms of how they map to the mainstream theory differentiates it from other social sciences.

SOCIOLOGY

INTRODUCTION

An examination of how knowledge is produced within sociology must first identify what sociology is. There is, however, some disagreement. The American Sociological Association provides five different definitions of sociology, ranging from “the study of society” (American Sociological Association) to “an overarching unification of all studies of humankind, including history, psychology, and economics” (American Sociological Association). An introductory textbook claims that “sociology pries open the doors of society so you can see what goes on behind them” (Henslin, 2006, p. xxvii).

One solution to the issue is what sociology studies; if all sociologists study something different from other social scientists, that will define sociology. However, sociologists do not seem to share objects of study: the American Sociological Association identifies 36 distinct specialties within sociology, which includes a substantial amount of diversity. The study of “visual sociology” is quite different from “rural sociology” or “family sociology.”

As sociologists study different things, is it possible to identify what is common across all specialties? Consider the mission statements for two specialties acknowledge by the American Sociological Association. The “body/embodiment” section declares that it pursues “scholarship on a wide range of embodied dynamics including human and non-human bodies, morphology, human reproduction, anatomy, body fluids, biotechnology, genetics; but also theories of embodiment, virtual bodies, productivity of bodies, changing bodies, life course and the body, body and spirit/soul, unequal bodies, micro and macro sociological analysis of the political, and social and individual bodies” (American Sociological Association, 2010). In comparison, the communications/technology section focuses on “the social aspects of computing, the Internet, new media, computer networks, and other communication and information technologies, the sociology of communications, [and] the design and use of technology in teaching and research” (American Sociological Association, 2010). One would be hard-pressed to find similarities in their objects of study.

Even though sociologists do not work within a single overarching theory or obvious similarities in objects of study, it is possible that they share a “core” upon which each specialty branches off from. There are two ways to identify the core of a discipline. One is by surveying practitioners, and the other is to examine what the conventional wisdom within the discipline is. As Lynch et al point out after an examination of all the available into sociology textbooks on the market, “textbooks provide coherent, if unsophisticated, accounts of the history, method, and aims of the discipline” (Lynch & Bogen, 1997, p. 484).

A study by Theodore Wagenaar (2004) examined what 301 sociologists believed to be the most important concepts and skills to develop in sociology. Wagenaar found that “there does seem to be an identifiable core in sociology” (Wagenaar, 2004, p. 17). Wagenaar found that the topics stressed in introductory courses were relatively representative of the topics deemed important for the undergraduate major. The primary difference was the added emphasis on performing research for the discipline in the major, whereas it was a very low priority for the introductory class (Wagenaar, 2004, p. 18).

Wagenaar found that, apart from methods and accepted theory, sociology students should learn about “differences and inequality [...and the] two basic concepts – sociological imagination and social structure” (Wagenaar, 2004, p. 12). The two basic concepts Wagenaar mentions are core assumptions about how the world is structured. Sociology requires students to accept that (i) social structure exists, and (ii) that social structure impacts the actions of individuals. Sociological imagination is the ability to see the relationship between social structure and individual action. Essentially, the two core concepts are an ontological commitment to social structure, and the relationship it has with individual agents. Inequality and social differences are taken to be the result of social structure.

Sociological textbooks corroborate Wagenaar’s results. A review of over one hundred introductory sociology textbooks found that “with rare exceptions, introductory textbooks begin with a discussion of the sociological perspective [...] and emphasizing the value of the ‘sociological imagination’ for students and professionals” (Lynch & Bogen, 1997, p. 486). For example, one introductory sociology textbook proclaims that sociology studies “how groups influence people, especially how people are influenced by their society – a group of people who share a culture and a territory” (Henslin, 2006, p. 2). In general, sociology “stresses the social contexts in which people live” (Henslin, 2006, p. 2). Sociologists refer to people’s positions in society as their “social location, the corners in life that people occupy because of where they are located in society” (Henslin, 2006, p. 2). Finally, sociologists typically assume that “the society in which we grow up and our particular location in that society lie at the center of what we do and what we think” (Henslin, 2006, p. 2). The ‘sociological imagination,’ or the way sociologists see the world, involves interpreting social life as a result of social structure and interactions.

William D’Antonio outlined a core for sociology in the early 1980s. A comparison of his outline with a modern introductory sociology textbook yields no significant differences (some minor additions). D’Antonio claims that “the core consists of concepts, theories, and research methods and is exemplified by a variety of research findings that have accumulated over time” (D’Antonio, 1983, p. 171). He identifies four theorists, three theories, some general concepts, and a few basic methods. Of note is his list of theoretical frameworks – which remains unchanged today, nearly thirty years later – that is composed of “functionalism, conflict, [and] symbolic interaction” (D’Antonio, 1983, p. 173). The list of theoretical frameworks is interesting because they oppose each other. Functionalism claims that society is a whole unit made up of different parts, each of which serve a ‘function’ in the larger society. The goal of functionalist sociologists is to identify the function that each aspect of society serves. Conflict theory, on the other hand, states that

“society is composed of groups that engage in fierce competition for scarce resources” (Henslin, 2006, p. 15) and is derived from Karl Marx. The purpose of sociologists working within conflict theory is to identify sources of conflict, the composition of the groups competing for resources, and who ‘wins’ the conflicts that shape society. Finally, symbolic interactionism believes that symbols are the key to understanding social reality. They postulate that people use symbols – and that it is symbols which separate us from animals – to communicate, interact, and define themselves. Sociologists operating within symbolic interactionism operate on the assumption that everything is a symbol, including the self, and the way to understand society is to study the different symbols which coordinate social life. D’Antonio’s inclusion of three different theories accepts that sociology does not have a single unifying theory that is accepted by most sociologists. Henslin (2006, p. 16) further instructs students that each of the three theoretical frameworks are both incomplete, and that *all* of them are necessary for a balanced view of society. Contemporary sociology includes additional, and likewise incommensurate, theories. The “core” of sociology reveals is not a shared theory, but a shared history; and while that common heritage may result in similar opinions, it does not result in agreement.

Furthermore, while sociologists do employ a wide range of methods, methods themselves neither unify nor divide the discipline to a significant extent. An examination of the specialties within sociology by Cappell and Gruterbock (1992) finds that “the distinction between quantitative and qualitative research methods does not play a strong role in structuring the discipline” (p. 271). While some methods may be preferred in some specialties over others, the choice seems to be a result of different areas of study – not a matter of taking a method, and then examining reality through solely that method. Additionally, papers will cite both qualitative and quantitative information.

Similar to Wagenaar, the concepts D’Antonio deemed critical for the sociology student include the human group [...] the social system, [and] social organization” (D’Antonio, 1983, p. 173), socialization which includes “the social nature of the self, role learning [...] deviance and social control” (D’Antonio, 1983, p. 173), structured inequality, and social change. These concepts provide sociologists with a ontological framework: collectively, they amount to an assumption that (i) social structure exists, and (ii) that social structure impacts individual agents, and vice versa. Inequality is a result of social structure; individuals take on various “roles” and are socialized; and the social system changes over time.

Sociology, as a discipline, is not unified either by a shared theory, or a set of methods. Instead, it is united by a small number of theoretical concepts, or rather ontological assumptions. Sociologists assume that social structure exists, that it impacts individual agents, and that individual agents impacts social structure. As Jeffrey Alexander explains, “sociologists are sociologists because they believe that there are patterns to society, structures somehow separate from the actors who compose it” (Alexander, 2003, p. 201). Sociology aims to examine that structure. The primary source of disagreement is the “dichotomy [...] between individualistic and collectivistic positions” (Alexander, 2003, p. 201). The collectivistic position believes that “social order confronts newborn individuals as an established fact outside of them” (Alexander, 2003, p.

201), whereas individualists believe that the social order is “the result of individual negotiation” (Alexander, 2003, p. 201).

MAINSTREAM THEORIES

While sociology lacks a single unifying definition, it also lacks anything resembling a unified theoretical framework. Sociology “has no overarching theory but, instead, is theoretically fractured” (Moody, 2004, p. 214). Sociology has a number of theoretical frameworks in the mainstream, and sociologists continue to invent more.

Sociologists believe that sociology is “undoubtedly the broadest of the social sciences” (Crothers, 2005, p. 99), and that “sociology can only resist temporarily being brought into any controversies that arise in any corner of the social sciences” (Crothers, 2005, p. 99). The vast scope of sociology seemingly makes it impossible to construct a single unifying theory. Indeed, “since its disciplinary origins and through its predisciplinary inheritance, sociology has been host to a bewildering variety of traditions” (Crothers, 2005, p. 99). At no point has sociology approached a theoretical hegemony; it has been continually fragmented.

Part of the reason for the fragmentation is the disagreement about the nature of social reality. While sociologists operate under the “premise that social statuses and social roles comprise major building blocks of social structure” (Merton, 1957, p. 110), the precise nature of social structure, and the influence they have on individual behavior is contentious. The issue can be divided into two camps, collectivism and individualism. Collectivism is associated with Durkheim, and individualism is associated with Weber (Dowd, 1991, p. 311).

Collectivism is defined by the belief that social structure exists “prior to any individual specific act” (Alexander, 2003, p. 201), and as an “established fact outside [of people]” (Alexander, 2003, p. 201). Social objects are seen as “possessing a life of their own, external to and coercing the individual” (Bhaskar, 1998, p. 40). The collectivist camp is epitomized by Durkheim, who defines a social fact as “every way of acting which is general throughout a given society, while at the same time existing in its own right independent of its individual manifestations” (Durkheim, 2003, p. 48). Social structure, within the collectivistic ontology, is fundamentally separate from the individual and acts to influence behavior. The various theories under the umbrella of collectivism typically depends on the ability the individual has to resist the external social objects; the universal assumption is that social structure is external and coercive.

However, individualist theories “insist that [... social] patterns are the result of individual negotiation [...] the assumption is that individuals can alter the fundamentals of order at each successive moment” (Alexander, 2003: 201). Individuals volunteer social structure within each social interaction; structure is not only not external to individuals, but it also does not exist separate from individual interactions. Social patterns are emergent from individual actions and negotiations, and are the result of individual interaction. Social structure is largely illusory.

Sociology is divided in other ways. Cappell et al (1992) identify variables which divide the discipline. They find that it is not research methods which divide the discipline; as above, the distinction between qualitative and quantitative research methods do not significant divide the discipline (Cappell & Gruterbock, 1992, p. 271). Instead, sociological research specialties exist across three dimensions; critical vs. applied, micro- vs. macrosociology, and 'professional power.' The last dimension, professional power, is a measure of the resources dedicated to each specialty; e.g. the amount of funding it receives. The critical vs. applied dimension indicates a "lack of integration between theoretical and applied sociology" (Cappell & Gruterbock, 1992, p. 271). In other words, the work theoretical sociologists are producing is not being used by "applied," or evidence-gathering, sociology; and vice versa. The micro- vs. macrosociology dimension identifies the "unit of analysis;" it mirrors the distinction in economics. The split exists because there are "phenomena [that] exist and have meaning at one level but not another" (Smith J. , 1991, p. 8). The distinction between collectivism and individualism arises partly due to this distinction; collectivists typically operate at a macro-level and do not try to predict individual behavior. Individualists, on the other hand, tend to deal with phenomena at the individual level and not concern themselves so much with society at large.

The theoretical traditions have remained separate largely because they are incommensurable; each makes claims which fundamentally violate at least one other theory. The quintessential example is postmodernism, which (ironically) rejects the conception that theory is even possible.

However, despite the fragmented nature of sociology, "many sociologists would agree that the influence of sociological traditions is in fact *necessary*" (Crothers, 2005, p. 79). Theories are necessary in part because define what should be studied, and how one should go about studying the phenomena. The theories "emphasiz[e] certain aspects of social phenomena, different scales of analysis, [and] a changing degree of sophistication in engaging with social reality" (Crothers, 2005, p. 99). Theories are useful tools, and thus any theory is better than no theory. The sheer diversity of theories in sociology reflects this approach.

FUNCTIONALISM

The first main theory is functionalism, and its successor neofunctionalism. Functionalism focuses on the premise that a society is a *system*, and must therefore operate as a system. Talcott Parsons, a founder of functionalism, claimed that "there are minimum social conditions necessary for the production, maintenance, and development of cultural systems" (Parsons, 2003, p. 191); that if the social system did not perform certain necessary functions, then society could not exist or survive. The need to perform certain operations means that "tendencies for deviant behavior on the part of the component actors pose functional 'problems' for the social system in the sense that they must be counteracted by 'mechanisms of control'" (Parsons, 2003, p. 192). A consequence of the stance that society needs to perform certain operations to remain in existence is that individuals have very restricted behavior. The degree to which society restrict behavior would be influenced by what is necessary for the society to survive – that is, a wealthy society suffering no external threats to its existence could tolerate a fair amount of non-productive and diverse behavior. But a

society facing significant threats to its existence – whether from a lack of resources, neighboring societies threatening war, and so on – would sharply reduce the amount of freedom it afforded individuals. In the most threatened societies, every individual would have to perform a function which benefited society; if they chose not to, they would be compelled to do so by the ‘mechanisms of control’ the society maintains (or imprisoned).

The core of functionalism is to “understand social phenomena in terms of their relationship to some system” (Bredemeier, 1955, p. 173). Bredemeier (1955, p. 180) outlines six tenets of functional analysis. First, functional begins with “a statement of the kind of action necessary to maintain some system of interrelationships.” After establishing what action is necessary to maintain the system, the sociologist should state the “motivational conditions which are necessary to produce that action,” then describe the “motivational patterns actually operating.” Subsequently, the sociologist should seek to find the source of the patterns; to isolate the structural criteria responsible for the actions. The sociologist should then compare the “consequences of the operating motivation with the motivations described as necessary,” and see if they match up; if not, a structural action must be provided to explain the discrepancy. Finally, the sociologist should assess how the observed system of interrelationships maintains the overall system of which it is part.

The data functionalists employ is, of course, up for debate. However, due to the need for large-scale evaluation of behavior and motivation, there is a “postulated link between functionalism and survey research” (Crothers, 2005, p. 95). Functionalists are concerned with regularities of behavior which may indicate social structure, and identifying those regularities is key. Though functionalists can – and have – employed nearly every possible technique, there is a tendency towards surveys, and participant observation (Crothers, 2005).

CONFLICT THEORY

The second main theory is conflict theory, heavily influenced by Marxism. Conflict theory begins from the supposition that social society is characterized by conflict; specifically, group conflict. A leading conflict theorist, Lewis Coser, explains that “in every type of social structure there are occasions for conflict, since individuals and subgroups are likely to make from time to time rival claims to scarce resources” (Coser, 2003, p. 208). The goal of sociologists would be to document the groups that existed in society, explaining how and why individuals became members of those groups, and then explain how groups come to conflict; and how that conflict resolves itself. However, conflict theorists are quick to note that conflict does not inevitably arise in civil war; “in flexible social structures, multiple conflicts crisscross each other and thereby prevent basic cleavages across one axis. The multiple group affiliations of individuals makes them participate in various group conflicts so that their total personalities are not involved in any single one of them” (Coser, 2003, p. 209). Simply put, individuals can be members of multiple different groups; the amount of power a group has depends on the commitment of all group members; since few individuals will be completely committed to one group, their support for any one group would be limited by other group commitments, therefore ensuring stability. Conflict theory focuses on

group-level interactions, and assume that individuals can be influenced to support the group-level agenda. Social groups must exist, and every individual must be a member of a group, because “life is basically a struggle for status in which no one can afford to be oblivious to the power of others around him” (Collins, 2003, p. 229). Thus, conflict theory assumes three things: that “men live in self-constructed subjective worlds; that others pull many of the strings that control one’s subjective experience; and that there are frequent conflicts over control” (Collins, 2003, p. 229). Individuals are not the units of analysis, and may be safely disregarded. However, conflict theory does not limit itself to studying economic resource clashes; it purports to explain much more about society. Conflict theorists argue that “a strong case can be made for group consequences having consequences which [...] are utterly necessary for the social process” (Dahrendorf, 2003, p. 218); in fact, that “conflict is a condition necessary for life to be possible at all” (Dahrendorf, 2003, p. 219) such as creativity. Conflict becomes a source of change, and without conflict society would remain unchanging and stagnate.

Randall Collins (2003) outlines elements of conflict theory methodology. He instructs sociologists to “think through abstract formulations to a sample of the typical real-life interactions” (Collins, 2003, p. 229) while thinking of people as “animals maneuvering for advantage” (Collins, 2003, p. 229). The results of conflict will be found in the “material arrangements that affect interaction” (Collins, 2003, p. 229) such as physical locations, forms and modes of communication. The results should be easy to see, because the dominant side will have accumulated more resources for themselves, and deprived others of their fair share.

Since the evidence of social structure is made manifest in the material differences between groups, and membership in a group is defined by similar resources situation, sociologists can define social structures in terms of “the behavior following from various lineups of resources” (Collins, 2003, p. 229), and social change as shifts in resource distribution.

The non-material situation, that is “ideals and beliefs” (Collins, 2003, p. 230) which people hold are also a function of the “the interests which have the resources to make their viewpoint prevail” (Collins, 2003, p. 230): namely, the dominant class. The dominant class will, for instance, encourage people that they deserve the situation they are in, or that they should be grateful to the dominant class; in other words, the dominant class will maintain its dominance by reducing the real or realized power of the subordinate class.

In other words, “the free flow of organizational information is impeded by elites [so] methods of data collection which assume a hostile environment must be devised” (Lundman & McFarlane, 1976, p. 503). Elites are likely to deny sociologists access to the necessary data, either overtly or covertly (Lundman & McFarlane, 1976, pp. 504-505). Therefore, sociological analyses performed with either the cooperation of the people in charge, or using data provided by them, cannot be trusted. The results will either be distorted or hidden. Additionally, elites will attempt to hide any distortions they have made, and legitimize the status quo. Consequently, a sociologist cannot use *any* data without knowledge of how the elites have distorted reality. Of course, this requires a presupposition that the elites have done so, because it could only be discovered with effort

(Lundman & McFarlane, 1976, p. 507). Needless to say, results gathered under this theoretical structure are *very* theory-laden.

SYMBOLIC INTERACTIONISM

The third major theory is symbolic interactionism. Symbolic interactionism takes a different approach from both functionalism and conflict theory, which focus on identifying social structure, and instead focuses on how individuals interact. It assumes that “human interaction is mediated by the use of symbols, by interpretation, or by ascertaining the meaning of one another’s symbols” (Blumer, 2003, p. 241); since interaction is fundamentally defined by symbols, the only way to understand human behavior is to examine the symbols they use to communicate. They point out that “group life is organized around communication [...which] signifies shared meanings” (Strauss, 2003, p. 235): without communication, groups simply cannot exist. Therefore, “the constitution of any group is [...] a symbolic, not a physical fact” (Strauss, 2003, p. 235). An examination of the symbols used by people purportedly belonging to the same group can shed light both on what *defines* the groups – that is, the symbols all group members share – but also the degree to which people belong to groups. Symbolic interactionists can identify group members even if they never interact by their shared symbols; they can also identify people who seem to belong to the group, but do not use all the symbols that define the group (say, because they belong to another group which offers conflicting symbols). Of course, symbolic interactionists do not limit themselves to the most obvious forms of communication or groups. Individuals symbolically define themselves; and because “human society is made up of individuals who have [symbolically defined] selves [...] and] that individual action is a construction and not a release [...] and] that group or collective action consists of the aligning of individual actions” (Blumer, 2003, p. 243), all individual action can be said to be a result of the symbols they employ. Since all action takes place within society, and individuals interact with society via symbols, then all action is fundamentally symbol-driven. People must take into account the how their actions will be interpreted, and therefore every action is symbolically constructed. Furthermore, group actions are simply the collection of individual actions, so that by examining individual and shared symbols, the sociologist can explain and predict social action.

Norman Denzin laid out how symbolic interactionists should approach empirical research. He identifies a number of principles for the symbolic interactionist, which delineate what must occur for an empirical study to be convincing. He first claims that symbolic interactionist assumes that “behavior is self-directed and observable at two distinct levels – the symbolic and the interactional (or behavioral)” (Denzin, 1970, p. 6). Therefore, a sociologist must bring together “symbols and interaction [...] before an investigation is complete” (Denzin, 1970, p. 7); a failure to unite the symbols with behavior means that the research is incomplete, and unconvincing.

Furthermore, since symbols are constructed by individuals, the “reflective nature of selfhood must be captured [...] indicate how shifting definitions of self are reflected in [...] behavior” (Denzin, 1970, p. 8). Behavior, in other words, must follow from or embody meaning represented by symbols.

Sociologists must “link man’s [...] self with the social circles [...] a] failure to achieve this link leaves studies of human conduct at an individualistic level” (Denzin, 1970, p. 10); in other words, they need to show how the individual connects with society. Conversely, examining symbols used by groups and ignoring individual behaviors is likewise unconvincing because groups are defined by their individuals – ignoring the individual makes it impossible to have any idea of the impact group members have on society.

Additionally, symbolic interactions stress the dualistic nature of their enterprise; in studying symbolic use in society, they both use and create symbols themselves. Symbolic interactionists must accept that science “reflects a continual attempt to lift one’s own idiosyncratic experiences to the level of the consensual and the shared meaning” (Denzin, 1970, p. 12). Since sociology is fundamentally a constructive act rooted in one’s subjective experience, sociologists must be careful to explain their subjective experience; that is, “whenever sociologists engage in observation, they must record the dynamics of their specific observational situations” (Denzin, 1970, p. 10). There is thus a connection “between symbolic interactionism [...] and participant observation” (Crothers, 2005, p. 94). In fact, participant observation is almost essential to understand symbol use and modification.

Symbolic interactionists conceive of the symbols in society as every-changing; therefore, “research methods must be capable of reflecting both stable and processual forms” (Denzin, 1970, p. 11). If the methods employed can only measure some social feature at a single moment in time – and not explain how it will change – the method is insufficient and the results suspect. An example would be studying marijuana use among groups. For the symbolic interactionist, a key goal would be “show[ing] that a marijuana user’s attitude toward outsiders is reflected in his behavior in their presence” (Denzin, 1970, p. 8); but it would be “insufficient to document only the fact that users do not like to get ‘high’ when an outsider is present [...] [one] must go further and demonstrate how this attitude is influenced by contact with nonusers” (Denzin, 1970, p. 8). Symbolic interactionism therefore establishes several criteria that must be met, some of which are ontological – e.g. the existence of symbols – and some of which are functional, such as the relationship symbols have with behavior.

PHENOMENOLOGY

Phenomenology emphasizes the pre-eminence of the individual’s view of the world.

Phenomenologists believe that “the very idea of an objective observer distorts reality and, thus, impedes knowing it” (Smith J. , 1991, p. 7). The task of sociologists, then, is to “scientifically describe a world that includes as problematical phenomena not only the other person’s actions, but the other person’s knowledge of the world” (Garfinkel, 2003, p. 275). However, describing another person’s knowledge, or perspective, is challenging because “all the knowledge we have [...] [is] derived from our own past experience, direct or indirect [...] as is] all the knowledge we have acquired from others” (Schutz, 2003, p. 265). In other words, all social knowledge is subjective. The knowledge an individual has about the world is significant because “in everyday situation what [the individual] knows is an integral feature of his social competence” (Garfinkel,

2003, p. 281); as such, sociologists cannot ignore individual knowledge and average across multiple individuals. One of the reasons a sociologist cannot average across groups is that people frequently pass between “versions” of the social world; their impressions and conclusions are context-dependent. Harold Garfinkel explains that “passing from the use of one set [of assumptions about the world] [...] to another [...] produces a radical alteration in the person’s scenic structuring of the event and their relationships [...] they are[logically incompatible” (Garfinkel, 2003, p. 282). Since understanding will change from context to context, on an individual level, and that change can produce dramatically different results from objectively similar circumstances, both the knowledge an individual has and how they transition from one perspective to another is critically important. However, since individual knowledge is derived from past experience, the only way to truly understand another’s perspective is to experience it. As Alfred Schutz explains, “once [...] I stood by the side of a man [...] manufacturing something [...]and] as I watched him work, I knew exactly what was going on in his mind. If it were not for this experience I would not know what to make of the finished product” (Schutz, 2003, p. 265). It is therefore necessary for a sociologist to take part in the experiences of social actors, and only after acquiring an understanding of how they view the world attempt to analyze their actions. The sociologist can then determine “underlying structures of an experience by interpreting the originally given descriptions of the situation in which the experience occurs” (Moustakas, 1994, p. 13). Phenomenology differs from symbolic interactionism in that symbolic interactionists assume that the symbols are objectively available; that they can step in and assess the symbols people and groups employ without becoming a part of the group (e.g. via interviews). Phenomenologists, however, hold that simply asking people what they think is not sufficient to understand them; that it is necessary to understand how they think, and the only way to do so is to share the experiences of the people under examination.

Phenomenology assumes that observations are theory-laden – that is, that observers will see the world according to their preconceptions, and not as the world actually is. Their methodology insists that the sociologist abandon all presuppositions about what they are studying, that they embrace ‘atheoretical empiricism’ (Heritage, 1987, p. 265). Instead, the researcher focuses on “studying *how* the participants create, assemble, produce and reproduce the social structures to which they orient” (Heritage, 1987, p. 231). However, this assumes (i) that social structure exists, and (ii) that it can be produced and reproduced by individual action, as opposed to individual action being the *result* of social structure, ala Durkheim.

Phenomenology assumes of intentionality and experience; that people actively interpret the world according to the knowledge, and that their actions in the world are intentional and a result of that knowledge and how they interpret the world around them. In other words, phenomenology is “the study of the properties of practical common-sense reasoning in mundane situations of action” (Heritage, 1987, p. 231). The focus is on *normal* – mundane – action, with the awareness that people behave differently in abnormal situations (Heritage, 1987, p. 233).

However, “the knowledge which is used in everyday settings cannot be analyzed independently of the courses of action through which it is acted upon, maintained, and validated” (Heritage, 1987,

p. 266). If people react to social structure, and produce and reproduce it, then the knowledge they have is contextual, as is the intentionality of their actions. The same behavior in two different situations can have entirely different meanings to the individual (Heritage, 1987, p. 249). Phenomenological analyses must take place naturalistically.

For example, phenomenologists have employed conversation analysis, either with the sociologist in an interview or naturalistically with another person. Conversation analysis provides a wealth of data for a phenomenologist, because the situated knowledge of the individual is articulated. Conversation analysis is “perhaps the one most occupied with the characteristics of social action” (Heritage, 1987, p. 256). Phenomenologists also employ participant observation, and forms of content analysis.

EXCHANGE THEORY

George Homans, a founder of exchange theory, states that “an incidental advantage of an exchange theory is that it might bring sociology closer to economics” (Homans, 2003, p. 296). Exchange theory roots itself in behavior psychology, and specifically their learning paradigm. The two key principles are *reinforcement* and *satisficing*; that is, people will increase behaviors which are “reinforced,” and people do not have unlimited wants, i.e. they can be “satisficed” by some amount of good. George Homans defines social behavior as “an exchange of goods, material goods but also non-material ones, such as the symbols of approval or prestige” (Homans, 2003, p. 303). Similar to symbolic interactionists, exchange theorists conceptualize every social interaction of an exchange of some kind; but where symbolic interactions limit their examination to the symbols used to communicate, exchange theory folds in everything else – emotions, resources, etc. Since social behavior is an exchange, sociologists can assume that people are rational and make the basic assumption that people “establish social associations because they expect them to be rewarding and expand it because they experience it to be rewarding” (Blau, 2003, p. 335). The statement that social interactions are expected to be rewarding does not preclude people being wrong; it also does not imply normative statements about the exchanges people should take part in. The value people ‘get out of’ relationships is subjective, and cannot be measured externally. However, the assumption that people will only engage in relationships they find rewarding allows exchange theorists to adopt certain explanations. For instance, exchange theorists can conclude that “dependence on reciprocated choices implies that, if I want to associate with someone, I cannot realize my goal unless I make him interested in associating with me” (Blau, 2003, p. 334); consequently, it must be possible to identify social behavior where people seek to make others interested in them. Additionally, since within exchange theory individuals maintain relationships they expect to be beneficial, it follows that people who help others expect to be compensated at some point. Exchange theorists can thus invent social capital, and explain that “social capital is [...] embodied in the *relations* among persons” (Coleman, 2003, p. 317); it then becomes possible to measure the amount of influence, or social power, any one individual has by estimating the social capital they have accumulated. The goal of sociologists becomes to determine the social relationships people have established, to measure the amount of social capital individuals have within the system, and to identify how socially valuable certain behaviors are. Social structure can

then be explained as structures established to make certain social relationships more beneficial; and figuring out how social structures do so also becomes an area for study.

The methodology employed by exchange theorists reconfigures the object of analysis. Of course, some of the propositions in exchange theory “are not testable [...and] should be employed as assumptions” (Emerson, 1976, p. 343); exchange theory thus resembles economics in having a central set of assumptions from which to derive explanatory models. And, like economists, they have an empirical component as well. Exchange theorists “pay special attention to the reciprocal flow of valued behavior between the participants” (Emerson, 1976, p. 347); the unit of analysis becomes the social *exchange*, and not the person within the system. Exchange theory becomes the examination of social networks, maintained by exchanges. Modern exchange theory has focused on ‘network exchange theory,’ which analyzes social network data – dyadic connections between individuals – to determine reciprocal relationships.

FEMINIST THEORY

The sixth major theoretical tradition, feminist theory, has been less popular than other traditions but exerted a substantial amount of influence. Feminist sociology was established to explain the “actualities of women’s experience” (Smith D. E., 2003, p. 360) from a woman’s point of view. Indeed, “the standpoint of women locates a place to begin inquiry” (Smith D. E., 2003, p. 361); the purpose is to evaluate society in terms of how it affects women. In this respect feminist sociology is similar to phenomenology, which takes that understanding people requires sharing their experiences. Dorothy Smith, one of the founders of feminist sociology, explains that “remaking sociology was a matter that arose out of practical demands [...] established sociology distorted, turned things upside down, turned us into objects, wasn’t much use” (Smith D. E., 2003, p. 361). Feminist sociology set out to explain how certain features of society affected women; how women were treated differently than men; and what it means to be a woman. One of the areas of study of feminist theory has been gender roles; particularly to assert that gender has “no ontological status apart from the various acts which constitute its reality” (Butler, 2003, p. 347) and that “gender does not necessarily follow from sex” (Butler, 2003, p. 347), or that what defines a woman socially can be distinguished from her physical sex. A further goal has been to establish that women have been oppressed by society, and to explain how that has occurred; for instance, to explain “how public service systems of job descriptions organize gender-differentiated career lines” (Smith D. E., 2003, p. 369). Since feminist theory aims to explain how women have and continue to be oppressed, they seek to examine how existing social structures oppress women; to take, for instance, how universities teach social science and humanities and explain how “teaching the canon is patriarchal activism” (Smith D. E., 2003, pp. 367-368). In other words, feminist theory seeks both to explain how something can *appear* to be neutral but have the invisible side effect of oppressing women, and also to determine precisely what it means to be a woman, both socially and personally.

There is no distinctive feminist method (Harding, 1993). The contribution of feminist theory is better understood as an ontological shift. Feminism adds the perspective of women, in

contradistinction to “traditional social science [that] has begun its analyses only in men’s experience” (Harding, 1993, p. 6). Feminist theory opens up new material for study, but it does not advocate any particular epistemology.

CRITICAL THEORY

Critical theory arose to “explain why the socialist revolution prophesied by Marx in the mid-nineteenth century did not occur as expected” (Agger, 1991, p. 107). The conclusion that critical realists came to was that “Marx underestimated the extent to which workers’ (and others’) false consciousness could be exploited to keep the social and economic system running smoothly” (Agger, 1991, p. 107).

Consistent with that conclusion, sociologists who ascribe to critical theory are “wholly distrustful of the rules of conduct with which society as presently constituted provides each of its members” (Horkheimer, 2003, p. 386); their task is not to measure what people think, or why they act in a certain fashion, but rather to change society.

Critical theorists have “considerable ambivalence [...] toward empirical research” (Comstock, 1982, p. 370), and instead prefer to derive their critique from “statements about relation relationships from basic universal concepts” (Horkheimer, 2003, p. 388), and is specifically concerned with changing society to increase human freedom. Max Horkheimer distinguished critical theory from ‘traditional’ theory because traditional sociological theory only attempted to *explain* society, whereas critical theory aims to *change* society.

Critical theorists aim to provide “enlightened self-knowledge and effective political action” (Comstock, 1982, p. 378) to alienated people who are “oppressed by and alienated from the social processes they maintain or create but do not control” (Comstock, 1982, p. 378). The process critical theorists follow is similar to the one Marx sketched out. Critical theorists begin by identifying “contradictions immanent in the dominant system of action” (Comstock, 1982, p. 381), and then “study the historical development of the social conditions and the current social structures that constrain the participants’ actions and shape their understandings” (Comstock, 1982, p. 381). The historical development of society will allow the critical theorist to identify the “dialectical tension between the historically created conditions of action and the actors’ understandings of these conditions” (Comstock, 1982, p. 383). The theorist will then “involv[e] the actors it studies” (Comstock, 1982, p. 385) and “elucidate the fundamental contradictions” (Comstock, 1982, p. 384), explaining why the current system is unsustainable in light of the manifest contradictions. Critical theory, in other words, exists to forward the Marxist project. Its methods derive from those Marx employed, which an emphasis on historical development, and the importance of contradictions. Critical theorists apply their analytical techniques to any data at hand.

POSTMODERNISM

Postmodernism takes issue with the “belief in the truth of one’s knowledge” (Bauman, 2003, p. 418), and instead insists that “truth is [...] a social relation” (Bauman, 2003, p. 418) which

functions “as aspect of the hegemonic form of domination” (Bauman, 2003, p. 418) in order to “install an artificial order” (Bauman, 2003, p. 419). Postmodernism can only be distinguished from modernism; where modernism was interested in discovering truth and establishing the best society, postmodernism rejects the very possibility of discovering truth. Postmodernism becomes “celebration of difference and contingency” (Bauman, 2003, p. 421), with contingency meaning that the truth one believes is only one of many possible ‘contingent’ truths.

The postmodernists are epistemic skeptics (Seidman, 1991) who believe that knowledge cannot be generalized. All “knowledge is contextualized by its historical and cultural nature” (Agger, 1991, p. 117). Postmodernism relativism, and takes it to an extreme. If social ‘facts’ are arbitrary, then ‘truth’ can only be evaluated with respect to some cogent set of social ‘truths.’ All knowledge is contextual relative to some set of values; knowledge can emerge from any consistent set of values, which means that every group that holds a set of values will have a different – and equally valid – postmodern account of the world. As a consequence, they advocate for “multiple class, race, and gender perspectives on problems” (Agger, 1991, p. 121). Postmodernists “argue for multiple methodologies” (Agger, 1991, p. 121), because no single methodology can access an objective truth. Truth is relative to some social group, so the methodology which can best grasp that truth will change from group to group. Postmodernism, essentially, is rejection of the very possibility of objective truth, and any epistemology which lays claim to an objective truth.

Postmodern sociologists are motivated by “the idea that there is something unique about contemporary conditions” (Mirchandani, 2005, p. 99). The task of postmodernism is to examine what is different about contemporary society, and how people today are different; how they have access to their own truths (or not). Consequently, “theorists of the postmodern often talk of an ideal-type channel-hopping MTV [...] viewer” (Featherstone, 2003, p. 427) who either develops an understanding of the truth, or “who flips through different images at such speed that she/h is unable to chain the signifiers together into a meaningful narrative, he/she merely enjoys the multiphrenic intensities and sensations of the surface of the images” (Featherstone, 2003, p. 427). The influence of postmodernism has been to challenge authority of all kinds; to interpret a statement about the world as a normative statement about how the world should be, and to emphasize the importance of what the person propagating that statement wants to accomplish. Postmodern sociologists cannot be said to have a cogent epistemology, as part of their *raison d’être* is to demolish epistemology.

MIDDLE RANGE

The plethora of choices for grand theoretical perspectives makes it difficult for sociologist to choose a theory. One solution is simply to focus on ‘facts’ – empirical work without the bother of an overarching theory, insofar as that is possible – and some sociologists took that route. However, that led to the characterization of some sociology as “enormous masses of undigested concrete observations are being piled higher and higher with but little thought of ever utilizing them fully for an abstract and systematic knowledge” (Znaniecki, 1968, p. 27). Merton proposed that sociologists create middle-range theory as an alternative to either grand theories or fallow

sociological facts. Middle-range theories which are “about a delimited range of social phenomena” (Merton, 1957, p. 109). The theories are neither general statements about all social phenomena, or grand theories explaining the inner workings of society. Instead, they are closer to the empirical data; they employ “abstractions not so far removed from the data of sociological observation” (Merton, 1957, p. 108). Middle range theory is ad-hoc, suitable to explain a single study. It may be expanded, when useful, to other theories; he provides the examples of “reference groups and social mobility, of communication, role-conflict and the formation of social norms” (Merton, 1957, p. 108). Middle-range theory is to compared with the grand theory of functionalism Talcott Parsons to which dedicated himself. Merton’s re-characterization of the purpose of sociological theorizing has been immensely influential.

Each of the theories outlined above takes a different approach to the practice of sociology. Each of the theories is deficient in some way. In response, contemporary sociology, dominated by the global hegemon of American sociology, is “laced with middle-range theories” (Crothers, 2005, p. 99), and in fact “fails to be concerned with theoretical synthesis” (Crothers, 2005, p. 99) at all. The reaction against a multiplicity of contradicting theories has been to reject theorizing altogether, and focus on creating empirical research. However, sociologists still employ the theoretical perspective in determining how to approach empirical work; they simply do not integrate the results of their work into the broader theory. Sociology is not atheoretic; it is theory-bound, but not cumulative.

MEASUREMENT

Similar to the other social sciences, measurement “represents the most fundamental dilemma confronting the sociologist” (Denzin, 1970, p. 98). Similar to economics, it is frequently the case that “variables of interest in a causal model are not observed directly, but other variables are observed that can be viewed of measurements of the variables, or ‘constructs’ or interest, such as prejudice, alienation, conservatism, self-esteem, discrimination, motivation, or ability” (Raftery, 2001, p. 12). Sociology employs proxy variables for the concepts they want to measure.

Sociology has employed an increasing amount of data over the past decades. The data “prior to the Second World War [...] tended to be fragmentary, often bordering on the anecdotal, and the statistical methods simple and descriptive” (Raftery, 2001, p. 4). Most of the increase has been in numerical methods, chiefly “based on the analysis of large high-quality survey sample datasets” (Raftery, 2001, p. 4). The trend towards analysis of large-scale data has occurred since the “mid-1960s when the manipulation of large datasets became practical for the first time as computers and statistical software became widely available” (Dowd, 1991, p. 314).

The increased availability of numerical methods has required methods for analyzing large amounts of data; consequently, “econometrics has been very influential in sociological methodology” (Raftery, 2001, p. 3) as econometrics attempts to examine data with similar characteristics (i.e. not collected in a laboratory setting).

The data which sociologists use varies tremendously according to what they are trying to accomplish and what component of society they are examining. However, it falls into four basic categories: (i) asking individuals questions, (ii) data about individuals, (iii) recorded observations, and (iv) material people produce.

Within each of the basic categories, sociologists can employ different types of data collection techniques. For instance, within the first category – asking people, or self-reports – sociologists can use surveys, structured interviews, or unstructured interviews. The type of data chosen is based on concerns the individual sociologist has; for instance, the data they think will reveal their object of study, and what they are capable of collecting (e.g. money). The second category, data about individuals, is most frequently compiled by third parties. While such data is frequently observational – data on peoples’ behaviors is inherently observational – the distinction is that the sociologist is not performing the observation; that falls into the third category. The third category, recorded observations, are when the sociologist observes the behavior of the individual as in the case of ethnomethodology. The last category, material people produce, can include works people write (autobiographies, news articles, etc), create (paintings, drawings), and so on.

Of course, “in its rawest form, a great deal of sociological data is textual – for example, interviews, answers to open-ended questions in surveys, and ethnographic accounts” (Raftery, 2001, p. 28). Most of this data is converted into numerical data for ease of analysis – for instance, the number of times an individual uses a word or refers to a concept in open-ended questions. Another example are “life histories [which] are typically analyzed by reducing them to variables and doing regression and multivariate analysis” (Raftery, 2001, p. 29).

The choice of data is driven partly by the theoretical perspective the sociologist is influenced by. For instance, “functionalists and conflict theorists focus on the macro level; that is, they examine large-scale patterns of society” (Henslin, 2006, p. 15) which lead them to rely on large-scale data sets (e.g. from surveys) and to use more correlational methods (e.g. regression). On the other end of the spectrum, “symbolic interactionists focus on the micro level, on social interaction” (Henslin, 2006, p. 15); the focus on face-to-face interaction means that sociologists tend to study individuals instead of teasing out groups from the data.

Social networks have been analyzed a great deal recently, particularly by sociologists influenced by exchange theory. The data for social networks “consist of sets of pairwise connections, such as friendships between adolescents, sexual relationships between adults, or patterns of marriage exchange and political alliance across social groups” (Raftery, 2001, p. 26). Data for social networks are a set of dyadic connections which can be analyzed as a social graph.

Overall, sociologists use the data available to them, and which they believe can reveal the conceptual phenomena implied by their theories. Sociologists are continuing to examine new kinds of data, and devise new methods for the data.

JUSTIFICATION

Journal articles, a “key institution of modern science” (Farraro 1997, 89), certainly publish a great deal of sociological research. However, sociology also incorporates book; to the extent that an author can make the statement: “as every sociologist knows, there are two ways to present the results of one’s research: through books and through journal articles” (Wolfe 1990, 477). The distinction seems related to the sociological specialty; in areas where research is moving rapidly, articles are preferred as they allow for “relatively quick publication followed by relatively quick obsolescence” (Wolfe 1990, 478). Books, on the other hand, tend to be published in areas where the pace of research is not moving quite as rapidly. Additionally, the larger nature of books gives authors more flexibility to construct overarching theories, or to analyze tremendous amounts of data – an example being Pierre Bourdieu’s *Distinction*, which through a very in-depth analysis of a survey crafts a theory about “social taste.”

Interestingly, despite the “dual labor market” (Wolfe 1990, 487), neither channel is preferred over the other. Both books and journal articles garner prestige and ensure tenure; in fact, most “ASA presidents have published books instead” (Phelan, 1995, p. 490) of journal articles.

The difference may be related to the type of research sociologists engage in. Given that the discipline is divided into empirical work and theoretical work, and books provide more space to sketch out a theory, there is reason to believe that sociologists choose the medium which they feel best encapsulates their work. In fact, within sociology “individual scholars are identified as primarily ‘article’ people or ‘book’ people” (Wolfe 1990, 477), and certain departments pay “disproportionate attention to one rather than the other as a way of making tenure and promotion evaluations” (Wolfe 1990, 477). Furthermore, “crossover tends to be rare” (Wolfe 1990, 477) between book publishers and article publishers. These facts reflect the tendency of individual departments to be strong in either theory or empirical work, and to therefore generally prefer that medium over another medium. It is therefore no surprise that “advocates of one method of presentation generally defend it over the other” (Wolfe, 1990, p. 479), because journals seem superior for empirical work, and books are better for overarching theories.

However, there is a difference between the two publication channels. Journal articles are peer-reviewed, where books are not. Certainly, it makes sense that people attempting to establish new sociological theories would prefer not to have their work denied because it did not fit into any existing social theory. As journal articles are likely to be more empirical, peer-reviewing them may reduce to determining whether or not they made any mistakes in their methods. The question remains, though, as to what criteria sociologists employ in refereeing articles.

There is no defined, or even regular, structure for sociology articles or books. Sociologists use a wide variety of argumentative techniques (Crow, 2005). Perhaps the most distinguishing feature are the wide variety of metaphors and analogies as “the discipline requires the exercise of imagination in order to look beyond common sense perceptions of the world” (Crow, 2005, p.

186). But sociologists will employ whatever rhetorical devices they can in order to write persuasively (Crow, 2005).

Despite the lack of common structure within sociology paper, there are some commonalities of content. As most theorists publish in books, the content of articles is predominantly empirical; either descriptive or explanatory. Since the 1930s, sociology articles have used an increasing amount of statistics. In 1935, only 35 percent of articles used any statistical testing at all; by 1995, over 90 percent of articles use statistical testing, and nearly 80 percent use the .05 significance level (Leahey, 2005). Sociologists have certainly embraced quantitative methods.

The increased use present journal articles is mirrored in graduate school. While PhD programs are not standardized and the “instruction and approach to [...] research that graduate students obtain depend largely on their Ph.D. program” (Leahey, 2005, p. 6), they do tend to share an emphasis on quantitative methods (Turner, 1998, p. 244). In the United States, “all graduate students [...] take two or more traditional methods courses, emphasizing a positivistic, rationalistic methodology and a quantitative form of analysis” (Dowd, 1991, p. 318). Only a small number of students take methods courses in in many schools “qualitative or historical methods” (Dowd, 1991, p. 318). The preferred methods in sociology are quantitative.

Similar to psychology, its methods seem to unite the discipline. Sociologists complain that “the structure of graduate education [...] has become liberalized” (Brady, Milkie, Hostetter, & Pescosolido, 2001, p. 266) such that basic standards have been abandoned. Students take methods courses and theory courses, but the “theory [...] is taught as a genre as opposed to an explanation of anything” (Turner, 1998, p. 245). Graduate students read classical thinkers, such as Weber and Durkheim, not to explain society but to understand the history of thought in the discipline. While a common understanding of the classical thinkers does, in a sense, unify graduate education, it is not relevant in modern praxis.

The diversity of theories in sociology means that the only things common in graduate education that students are expected to actually use, are the quantitative methods taught. The rise of middle-range theory as an alternative to working in a theoretical tradition has led to an increase in empirical work. The vast majority of sociological work is published in journals, and that work is dominated by American-style sociology which emphasizes empirical studies that do not tie into larger theoretical frameworks. The proliferation of this approach means that there are few criteria sociologists can use to evaluate the substantive value of a new paper to sociology, since most articles written do not attempt to add substantive value to sociology as a whole. Instead, each focuses on explaining a feature of society, and does not attempt to extrapolate to beyond that theory.

In short, sociologists have no criteria with which to evaluate sociology articles presented for publication. The lack of either a unifying theory or a unified philosophical perspective means they cannot evaluate the relevance of a new piece of knowledge with reference to the existing theory. The alternatives are either to evaluate the paper with respect to the referee’s preferred theoretical

perspective, or to fall back on evaluating only the methodology: what the stated goals were, whether the method was capable of measuring what the sociologist intended it to, and whether they correctly executed the method.

CONCLUSION

As a discipline, sociology is theoretically fragmented; unified only by shared ontological assumptions. The fragmentation has led to the rise of the approach favored by American Sociology: practically atheoretical empiricism. Of course, sociologists cannot study social phenomena without a theory, as a theory provides guidance on what to study, and how to study it. But the work most modern sociologists do is not intended to feed back into theory; it is not intended to *change* the theory in any fashion. Rather, sociological research is a mix of descriptive and intermediate-level theories that does nothing to reduce the theoretical fragmentation present in sociology.

Each theoretical tradition holds its own ‘epistemic culture.’ Advocates of one theoretical tradition will publish in certain journals, of which other advocates act as the referees. One consequence of the theoretical fragmentation, then, is a narrowing of the criteria to which sociological papers are examined. Core assumptions are unlikely to be challenged, and methods are unlikely to be examined too closely if they result in the expected conclusion. This tendency is not unique to sociology, but fragmentation diminishes the audience of potential critics.

The distinction between theory and applied work in sociology has, in part, led to dual publishing channels. While one type of work is not isolated to any channel, it is possible to characterize book-publishing sociologists as those more interested in theory, and article-publishing sociologists more interested in empirical work. The dual market for sociological research exacerbates the divide between theory and empirical work. Further research is necessary to determine the scope of the divide, such as citation analysis examining the number of books published in journal articles and vice versa.

CONCLUSION

The sciences differ in how unified they are. Economics is the most unified, as it has a mainstream theory which is then applied to every area of economics. Psychology, while lacking and overarching theory, shares a philosophical background and thus has a common approach. Sociology, on the other hand, is unified only in its object of study; it has conflicting theories and philosophical backgrounds. Certainly, sociology does stress the same core thinkers, but they are inspirational and the theories they provide are not useful for contemporary social practice.

While methods differentiated the disciplines – psychology uses primarily experiments, economics regressions, and sociology whatever it feels like – the differentiation has more to do with the data they collect than any methodological preference. The penetration of econometrics into sociology as sociologists acquired data sets with similar characteristics to those of economists is an example of scientists adopting the method most suitable to their research.

In all of the three disciplines, the publication of new research was largely through the journal system. The exception was sociology, where sociologists interested in constructing theory published in books that are not peer reviewed. Nonetheless, most sociologists publish through the journal system. As such, the journal editors and article referees determine whether or not a new item of research was worth publication – in essence, whether or not it was justified. However, the criteria they employ is irrational, as it is governed by their own personal preferences. Fortunately, people who participate in the journal system are restricted to those who have passed through graduate school and, in doing so, have acquired some shared foundational perspective. This common perspective prevents the judgments from being random; instead, the judgments are with respect to the contemporary beliefs and opinions of the subject's practitioners.

This account of science is similar to what Thomas Kuhn (1996) described. Kuhn described normal science as operating within a paradigm which provided the criteria for choosing what to study, how to measure it, and what techniques to use for analysis. Paradigm shift, which only occurs when scientists realize how divorced the paradigm is from reality, is governed by the scientists who were previously practicing in the discipline. The account is fundamentally irrational, because it is self-referential.

However, Kuhn restricted judgmental control over knowledge to times of paradigm change. Within paradigms, during normal science, the paradigm provides the justification criteria. However, this account of the epistemologies of economics, psychology, and sociology shows that, through the journal system, scientists determine the amount of justification new research has. The referees leverage their own subjective criteria, which is a function of the discipline they operate in; an economist could not evaluate new psychological research, even if one accounted for the lack of knowledge. The subjective criteria is discipline-specific, and even domain-specific.

The continual change of knowledge within the social sciences, and the self-referential and subjective nature of justification, suggests that additional work should be done to determine the structure, if any, that exists within the journal system. The problem is locating structure within a discipline that has no objective structure; structure is *emergent* from the practices of the discipline, and the practices of the discipline themselves emerge from their objects of study.

One possibility to explain the path of science is with reference to another ‘irrational’ yet progressing pattern: evolution. Broadly speaking, evolution facilitates change through variation, selection, and inheritance. A superficial application of evolution to the social sciences discussed here would characterize individual scientists as varying their practices to create knowledge, the knowledge being selected by the discipline – via the journal system, acting as a proxy – and inherited into the stock of knowledge within the discipline- becoming something with which to judge future studies. Further research is necessary to investigate the degree to which science develops in an evolutionary fashion. However, one implication of the evolutionary model is that fragmentation within disciplines is good; unification of method and theory may stifle the evolution of knowledge in the discipline, as the first criteria would be adherence to the existing knowledge base⁶. New studies would thus add nothing more than what Popper would call “ad hoc” hypotheses to the knowledge of a discipline. Thus, an examination of the selection pressures in each discipline may allow one to predict the relative success of that discipline.

⁶ More contentiously, it would allow one to draw a direct link between the knowledge-gathering activities of the Vatican during the Middle Ages and modern science; the difference being that the Vatican was interested in maintaining its existing knowledge, whilst science is (ostensibly) interested in making an impact on the world (physical or social). The demarcation criteria would shift from the **practice** of science to the **selection pressures** – any method (even skatharomany) can be scientific, as long as the practitioner agrees to meet certain selection pressures.

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