

Toward an Integrative Approach to Studying Consciousness: Encouraging Qualitative Methodology Training

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Abstract

Conducting research on human consciousness is problematic because it is done from a third-person perspective, whereas consciousness is a first-person experience. An integrative approach to studying consciousness that includes multiple modalities of measurement, combining experimental and correlational methods, combining quantitative and qualitative methods, and incorporates intersubjective validation is proposed. A survey of the required statistics and research methods courses in undergraduate psychology programs at the top national universities and colleges indicate that nearly all of the programs require at least one statistics course and a research methods course. However, very little course coverage is dedicated to qualitative methods. Students will need to pursue individual research with psychology department faculty to receive training in qualitative research methodology. Fostering an integrative methods approach to studying human consciousness will only be successful if qualitative research training is encouraged in undergraduate psychology programs.

Keywords: Qualitative research, integrative research, mixed methods, consciousness

We are all intimately familiar with our personal experience of consciousness. Yet, for something as familiar to us as consciousness, it has been difficult to study scientifically. The major obstacle is the subjectivity of the phenomenon (Mandik, 2001). Consciousness is experienced from a subjective first-person point of view while scientific investigation is conducted from an objective third-person perspective (Chalmers, 1999). The first-person perspective of consciousness makes it difficult to investigate consciousness because the nature of someone's experience cannot be entirely verified. As such, the use of qualitative research techniques could provide a means for better understanding the first-person perspective. An approach that integrates multiple modalities of measurement, experimental and correlational methods, and quantitative and qualitative methods could provide more information about the nature of consciousness than any one of these methods alone.

Those who have studied the philosophy of mind are well acquainted with Nagel's (1974) article "What is it like to be a bat?" In that article, Nagel concluded that we, as humans, could never know what it is like to be a bat. He argued that no amount of objective knowledge about bats could provide us with the subjective experience of what it is like to actually be a bat. This is similar to Jackson's (1982) thought experiment about a scientist named Mary who has never seen the color red. Mary has lived her entire life in a black and white room. She has studied color extensively and knows all the physical facts of color vision (e.g., properties of light, the electromagnetic spectrum, etc.). Yet, knowing about the physical aspects of the color red is not the same as actually seeing the color red (Feser, 2006). Conscious experience is something that Nagel (1974) argued must be beyond the strictly physical attributes of seeing a color. The difference between the physical properties of a stimulus and the subjective experience that accompanies it is often referred to as the problem of qualia.

Chalmers (1995) expounded on "the problem of qualia" by describing what he called the hard problem of consciousness. The hard problem is the problem of understanding why we have certain experiences. A vision scientist might show someone a color swatch of 650 nanometers and find that they respond that they see red. The hard problem asks why we see red at all. Chalmers states that the difference between neural activity and our actual

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experience reflects an "explanatory gap." This explanatory gap reflects that difficulty of verifying first-person experience from a third-person observer point of view. Although this is a very difficult problem when investigating consciousness, it is not insurmountable. Some criteria need to be used for evaluating the first-person perspective.

Empiricism is one of the underlying assumptions of the scientific method. It provides a standard for evaluating research questions since it emphasizes objectivity and replication. Quantitative methods proceed from a third-person perspective and are empirical by nature. However, quantitative methods do not take the first-person perspective of conscious experience into consideration. To capture first-person information that describes what the individual experience of consciousness is like, qualitative methods need to be used. Combining quantitative and qualitative methods enables investigators to generalize from their results and to discover more about a phenomenon (Hanson, Creswell, Plano Clark, Petska, & Creswell, 2005). The use of multiple perspectives in research is often referred to as methodological pluralism (Barker & Pistrang, 2005; Johnson & Onwuegbuzie, 2004).

A pluralistic approach to studying consciousness may combine four basic components. First, different modalities of measurement can be included (Gravetter & Forzano, 2006). Second, experimental and correlational techniques may be used in the same study (Denzin, 1978; Miller & Gatta, 2006). Third, quantitative and qualitative techniques can be combined (Bryman, 2006; Johnson, Onwuegbuzie, & Turner, 2007). Fourth, an element of inter-subjective validation may be included that provides information about the nature of first-person experience (Frith, 2002; Varela & Shear, 1999). An underlying assumption of using multiple methods is that if the different approaches produce convergent results, then the validity of the results will be enhanced (Erzberger & Prein, 1997). A research program that generates convergent results will enable us to come closer to answering the fundamental questions related to consciousness.

Integrating Multiple Modalities of Measurement

The research process usually begins with deciding which constructs should be examined. Constructs are conceptual and can be anything from learning, intelligence, thirst, or anxiety. The way a construct is defined determines, in large part, how a study is designed. Operational definitions stipulate how constructs are measured. External expressions of constructs are classified according to their corresponding level of measurement. The major categories of measurement are self-report, physiological, and behavioral (Gravetter & Forzano, 2006).

Self-report measures are the most direct way to assess a construct. Asking someone to report on a question is the most straightforward way of assessing a construct. However, there are some disadvantages to self-report. When surveys are used, the major limitations are the non-response bias and social desirability bias (Ganellen, 2007; Rosenbaum, Rabenhorst, Reddy, Fleming, & Howells, 2006). The non-response bias occurs when a substantial number of individuals selected to complete a survey cannot be reached or fail to participate after being contacted. Participants may also want to be seen in a positive light and therefore report responses that they think are socially acceptable instead of what they actually feel. The non-response bias can be eliminated if in-person interviews are used instead. However, the interview cannot eliminate the possibility of the social desirability bias. It is easy for participants to distort their reports. When a participant distorts self-report responses, the validity of the measurement is undermined.

The second measurement modality is physiological. These measures provide an objective assessment of the construct in question. Physiological measures include heart rate, galvanic skin response, and brain imaging techniques such as magnetic resonance imaging (MRI) and positron emission tomography (PET). These measures can be correlated with various behavioral and cognitive activities. Evoked potentials are associated with recognizing different stimuli (Nehamkin, Windorn, & Syed, 2008). Brain imaging can indicate areas of apparent brain dysfunction associated with different mental and developmental disorders (Gothelf, Furfaro, Penniman, Glover, & Reiss, 2005; Linden, 2008).

The major advantage of physiological measurement is that it is extremely objective. The equipment provides accurate, reliable, and well-defined measurements that are not dependent on subjective interpretation by either the researcher or the participant. However, there are also disadvantages to using physiological measurement. These measurements often require equipment that is expensive or unavailable. The presence of monitoring equipment might also create an unnatural situation that could cause participants to react differently than they would under normal circumstances. Another important issue is whether the measurement provides a valid measurement of the construct in question. Heart rate may be related to fear, but heart rate and fear are not the same things. Other factors such as anxiety, arousal, and embarrassment may contribute to an elevated heart rate.

The third measurement modality is behavioral. Constructs can often reveal themselves in overt ways. Some behaviors can be directly observed such as laughing, playing, talking, and sleeping. Behavior is what is of interest here, not something serving a proxy for a hypothetical construct (Rosnow & Rosenthal, 2008). For example, if a psychologist was observing disruptive behavior in a classroom, then the actual behavior is what would be of interest. One disadvantage of this technique is that a behavior may be temporary or even a situational indicator of an

underlying construct. Thus, whenever possible it is best to measure a cluster of related behaviors than to rely on a single indicator.

Other behaviors are more structured and may need to be evoked through performance on a specific task. This is often the case when researchers are assessing cognitive or perceptual ability. Examples of these kinds of behavioral assessments include tasks that assess working memory or perceptual discrimination (Shin, Fabiani, & Gratton, 2006). For example, the number of words recalled from a list provides a measure of memory ability (Delogu, Raffone, & Belardinelli, 2009), whereas responding whether a stimulus is present or not is a measure of perceptual discrimination (Minkwitz et al., 2011).

Integrating Experimental and Correlational Methods

Many topics are only studied from either an experimental or correlational approach. Certain areas of investigation lend themselves better to one kind of approach than another. The area of cognitive science has primarily been the purview of experimentation while areas such as personality research are firmly in the domain of correlation. Conducting an experiment is the best way to find a cause-and-effect relationship. Correlation involves examining how variables are associated. It can be used to assist in the generation of statistical models. Some other statistical procedures that involve correlation include multiple regression, path analysis, discriminant analysis, and factor analysis.

An important consideration when considering whether to use correlation is the issue of internal versus external validity. Internal validity measures the extent that changes observed in a dependent variable are due to the effects of an independent variable, whereas external validity is a measure of the extent to which the results of a study can be generalized to a population. Experiments include random assignment, controls for various variables, and often take place in artificial laboratory settings. Consequently, experiments usually have high internal validity but low external validity. Correlation, on the other hand, does not involve the manipulation of variables and is usually more naturalistic. As a result, correlation often has low internal validity and high external validity (Jimenez-Buedo & Miller, 2010).

Incorporating experimental and correlational approaches in the same study provides a way of obtaining convergent information about the topic under investigation. Combining different quantitative methods in a study (e.g., correlational and experimental methods) is referred to as within-methods triangulation (Denzin, 1978; Johnson, Onwuegbuzie, & Turner, 2007; Miller & Gatta, 2006). Within-methods triangulation is not limited to quantitative studies. This method can also be used when multiple qualitative methods are combined in a single qualitative study. The within-methods triangulation approach provides a means of gaining greater insights than if a phenomenon were studied by using a monostrand approach (Tashakkori & Teddie, 2003) such as only conducting an experiment or only examining the correlation between variables.

Integrating Quantitative and Qualitative Methods

Many studies are approached from either a quantitative or qualitative point of view. Quantitative data exists in a numeric or graphical format, but not all data exists in numeric format. Some information, which is qualitative, exists in a narrative or pictorial format (Bryman, 2006). Specific examples of qualitative methods include ethnography, case studies, personal narrative reports, unstructured interview, and content analysis (Bryman, 2006; DiCicco-Bloom & Crabtree, 2006). The purpose of incorporating qualitative techniques into a study is to arrive at meaningful descriptions and “qualities” of experience, whereas quantitative techniques strive to discover meaningful “quantities” (Sofaer, 1999).

Being able to describe qualities of experience is essential to studying consciousness. This brings us closer to the idea of understanding “what it is like to be a bat,” a person, or anything else. An integrative approach to studying phenomenology incorporates both qualitative and quantitative techniques. Researchers who use mixed methods can investigate specific phenomena from more than one perspective, a process often called methodological triangulation (Erzberger & Prein, 1997). This is different from Denzin’s (1978) concept of within-methods triangulation. Using Denzin’s typology, the methodological triangulation in mixed methods research would be called between-methods triangulation.

The items on a qualitative questionnaire are usually framed in such a way that responses are free and text based (Bryman, 2006). The narratives in qualitative data are useful for understanding the first-person experience of consciousness. Qualitative data is usually collected for strictly descriptive purposes without any attempt to quantify responses. The responses stand on their own as a description of the behavior or experience in question. However, there are times when qualitative data is collected with the intent of converting it into quantitative information for statistical analysis (Onwuegbuzie & Leach, 2010). Content analysis is used to convert narrative information into categorical data based on prior knowledge or theory (Elo & Kyngas, 2008; Hsieh & Shannon, 2005).

It is important to note that not every research question will initially lend itself to a mix of qualitative and quantitative analysis. Yet, incorporating both types of research methods into a given study will encourage deeper analysis of questions and will increase our understanding of human behavior. An integrative approach can lead to the enhancement of quantitative findings, the grounding of qualitative findings in a more scientific context, or lead to discovery based on current levels of understanding (Shank, 2006).

Statistical Analysis Considerations

The statistical analysis of qualitative data is different from that of typical quantitative data. There are some things that researchers might want to include in their data analysis reports beyond just reporting the results of null hypothesis tests. The use of null hypothesis testing is greatly debated (Nickerson, 2000). Some aspects of hypothesis testing seem very arbitrary. For example, the common use of the standard significance level ($p < .05$) could be argued to be more a convention than a statistical imperative (Cohen, 1994; Krantz, 1999). What should researchers who are using an integrative approach to studying consciousness do when faced with this situation?

Results other than null hypothesis tests can provide more of a principled argument for supporting or refuting a hypothesis. This has prompted some researchers to suggest ways that statistical reporting could be improved (Killeen, 2005; Wilkinson, 1999). The APA formed a workgroup (APA Publications and Communications Board, 2008) that suggested standards for reporting the results of statistical tests. The recommendations focused around reporting the values of statistics, effect size, power analysis, and confidence intervals. Reporting the actual value of test statistics is more precise than stating that a value is less than a certain criterion. Measures of effect size indicate the apparent magnitude of effects. Power analysis shows the minimum sample size needed to detect an effect. Reporting confidence intervals gives a sense of the dispersion around central values.

Other considerations about statistical reporting are related to more subjective aspects of data analysis (Elliott, Fischer, & Rennie, 1999). For instance, if qualitative data is converted into objective behavioral category data, there needs to be an empirical reason for selecting the categories. Data coders need to be well trained on how they will group the data. A high degree of inter-rater reliability is necessary so that the data analysis is as objective as possible (Sofaer, 2002). Any time subjectivity becomes part of the data analysis there needs to be a clear rationale for the statistical choices being made. Of course, there is no such thing as decision free statistical analysis. Each decision should be based on existing theory, prior knowledge, or statistical assumptions as much as possible.

Encouraging Intersubjective Validation

Once research methods are integrated, the problem still exists of being able to verify the experiences of one person to the next. Some people are of the opinion that we can only infer evidence of other person's minds from overt actions. This may be the most fundamental problem in all of behavioral science. How can we verify the experiences of one person to the next? One method is to develop techniques that enable the validation of subjective experiences (Frith, 2002; Varela & Shear, 1999). A way to do this is to evaluate the reports of people having experiences at the same time.

Velmans (1999) suggests that the one thing that hampers studying consciousness the most is the difficulty of verifying personal experiences. He advocates an approach that encourages intersubjectivity. Learning to share personal experiences with other people makes subjective experiences intersubjective. When subjective views and descriptions converge, we can arrive at intersubjective agreement about what has been experienced. To do this, a method is needed to validate separate personal accounts of different experiences. Intersubjective validation is closely related to a technique called empirical phenomenology (Georgi, 1997, 2005) in which researchers try to link experiential data to existing theories.

A phenomenological approach must be central to an adequate science of consciousness since it adds the dimension of personal experience. Varela (1996) called for a science of consciousness which includes first-person, subjective experience. Varela suggested that we need to move toward an integrated or global perspective on mind where neither experience nor external mechanisms have the final word. Flanagan (1992) proposes that we adopt reflective equilibrium that combines the third-person and phenomenological accounts into a "natural method" that links phenomenological, psychological, and neural data.

One difficulty is that people may not be trained to use terminology that describes the subtleties of experience. Some people, such as sommeliers and persons employed to test perfumes, are trained to notice minute differences in sensory experiences. They gain a vocabulary that enables them to describe various wines or perfumes. However, there is no guarantee that two people who use the same words to describe an experience are in fact having the same experience. This is analogous to a color-deficient person responding that a certain hue is "red" because they have learned that is the name that other people call that color. So, we may not be able to entirely verify if two people are having the same experience despite the fact that they are using the same language to describe it.

The major problem here is that first-person data are not reducible to third-person data, and third-person data do not fully explain first-person experience. Chalmers (1995) contends that bridging principles connecting physical processes with subjective experience are needed to overcome this explanatory gap. The natural method that Flanagan (1992) advocates could be a means for arriving at these bridging principles. One way to develop bridging principles that reflect the phenomenological aspect of consciousness is by encouraging intersubjective validation of personal experiences.

Specific Frameworks for Studying Consciousness

Assuming that an integrated approach to studying consciousness is taken, what are the promising lines of research for studying consciousness? The first approach, which is quantitative and neuroscience based, is to search for the neural correlates of consciousness (NCC) (Crick & Koch, 2003; Rees, Kreiman, & Koch, 2002). This approach seeks to find correlates between specific conscious states and neural activity in the brain. Including a qualitative measure such as asking individuals to comment about their individual experiences or attitudes toward different issues while they undergo MRI or PET scans could add substantial information to this approach. For instance, a number of studies have been conducted in which participants responded to attitudinal questions about race relations while they underwent brain scans (Knutson, Mah, Manley, & Grafman, 2007; Lieberman, Hariri, Jarcho, Eisenberger, & Bookheimer, 2005; Richeson et al., 2003; Stanley, Phelps, & Banaji, 2008).

The second approach involves measuring overt behavioral responses. This can be anything from counting the number of words that a person recalls to measuring reaction time. An example was a study by Lutz, Lachaux, Martinerie, and Varela (2002) in which EEG data was collected while participants performed a simple visual task. The results showed that EEG patterns correlated with performance on the visual task. This approach to studying consciousness has limitations. Incorporating a qualitative measure that asks participants to report on their experience of performing a task could provide additional information about the nature of consciousness. The challenge becomes framing research questions in such a way that integrative methods can be used alongside traditionally used ones.

The third method is more phenomenological or narrative in nature. This approach entails using semi-structured interviews, questionnaires with open ended questions, or having participants give free verbal reports. As mentioned earlier, content analysis would need to be applied to the data if quantitative analysis is sought (Elo & Kyngas, 2008; Hsieh & Shannon, 2005). This approach may be the most difficult one to integrate with other methods. Research questions would need to be examined to determine how behavioral or physiological measurements could be added to the research design.

Survey of Undergraduate Psychology Programs

An integrative methods approach will probably be accepted in the field if psychologists are trained in qualitative methodology during their undergraduate training. Research courses are difficult for many students to deal with in their undergraduate psychology programs. A number of factors predict whether a student will be successful in their research courses. Most programs require a statistics course as a pre-requisite to the research course. There may not always be a direct correspondence with how a statistical test is presented in a statistics course from a mathematics department and how it relates to a given research design. Behavioral science statistics courses usually present the logic of when to use a particular test as compared to mathematical statistics courses where the focus is on presenting formulae and performing calculations.

Method

The psychology program requirements and the course catalog descriptions from the top 50 colleges and universities reported by US News & World Report (2012) were examined to see how many of them required a qualitative research methods course. The course content was determined by examining the course descriptions from the university catalog. If a research course was required, then it was determined whether the course dealt primarily with quantitative methods, qualitative methods, or if it incorporated both methods. Most introductory research methods courses present descriptive methods that include observation, surveys, case studies, and interviews. Although these techniques could be considered qualitative, courses that only dealt with these methods in a section on descriptive research were considered to be primarily quantitative research courses. Additionally, unless a course description explicitly stated that it focused on qualitative methods, the course was counted as a quantitative course.

Results

Due to the fact that the California Institute of Technology does not have an undergraduate psychology program, data was not collected from the institution. Results were tabulated for the remaining 49 programs. Table 1 shows which universities required a statistics and/or research methods courses in their undergraduate psychology programs. Forty-seven of the 49 programs (95.9%) required a statistics course; the two programs that did not require a statistics course, Dartmouth College and Case Western Reserve University, did require a research methods

course. Twenty-three programs (47.9%) required a statistics course and a research methods course. Seven programs (14.6%) required a single course that combined statistics and research methods. Eight programs (16.7%) required a statistics course and either two research methods courses or a research course and an experimental psychology program. Nine programs (18.8%) required a laboratory course or a course that focused on research in a particular area of psychology. Laboratory courses enable students to get hands-on training in various areas of psychological inquiry. Students could get qualitative training in these kinds of courses, but only if the professor they are working with is engaged in qualitative research. The University of Chicago and the University of Southern California were the only schools that explicitly stated in their course catalog descriptions that their research methods course incorporates qualitative methods. Psychology programs certainly encourage a thorough grounding in quantitative methodology.

Discussion

Most research methods courses cover descriptive designs, correlational designs, and experimental designs. The sections on descriptive designs usually include some coverage about observation, case studies, and surveys. That is a very cursory coverage of qualitative methods. The bulk of the course is spent presenting the various experimental designs. If a course includes discussion of quasi-experimental designs, then a little more time is given to more qualitative methods. However, the focus of most undergraduate psychology research methods courses is to give students a grounding in quantitative research methodology and analysis. If we want to encourage researchers to use more integrative methodology in their studies, then we need to foster this by giving our students more exposure to these techniques in their courses.

Although this is a sample of only 50 national universities, it is apparent that qualitative research methodology is not widely required in undergraduate psychology programs. A recent review (Skidmore, 2010) reported that six techniques (nonparametric, *t*-test, correlation, regression, analysis of variance/analysis of covariance, factor/cluster analysis) accounted for 75.1% of the statistical tests reported in educational and psychological journals. These techniques are all quantitative. It is difficult to incorporate qualitative methods into certain areas of inquiry. The fact that so many articles report these six quantitative methods indicates that other approaches are not being used as often. Researchers should consider incorporating qualitative methods as a means of including more detailed information about various phenomena.

Conclusion

The survey of undergraduate psychology programs indicates that very few require a qualitative research methods course. Yet, we need to include this kind of training if we expect that future researchers will use integrated research methods. Faculty can encourage their curriculum committees to require more coverage of qualitative methods or that a qualitative methods course be part of the required curriculum. This would go a long way toward fostering the integration of research methodology. Because of fiscal and time constraints, many researchers engage in areas of inquiry that they are the most comfortable. This also includes the kinds of research designs and analyses they use. The best way for researchers to integrate research methods is to provide the training at the undergraduate level.

Integrating research methods will get us closer to understanding the nature of consciousness and human behavior in general. Quantitative approaches can broaden their scope by incorporating experimental and correlational techniques. This will allow us to take advantage of the internal validity of the experiment and the external validity of the correlational study. Qualitative methods, such as content and narrative analysis, could also be linked with quantitative methods when possible. This will produce a richer body of information that has both a quantitative and phenomenological basis.

Additionally, multiple modalities of measurements could be combined whenever possible. By using different modalities, we can gather more data and get closer to understanding the true nature of consciousness. Combining self-report, behavioral, and physiological data is more challenging and the data analysis will be more complex. Much planning will need to go into deciding which statistical techniques should be used for analyzing a mixed methods research study but it will be worth the effort.

Any research program that investigates human consciousness should strive to combine and integrate as many of these techniques as possible. The most important aspect of studying conscious experience may be incorporating intersubjective validation. Researchers could include this method in their studies by training participants to respond to stimuli in a manner which suggests they are reporting similarly. An integration of all or most of the techniques described in this article will enable researchers to better answer the fundamental questions related to personal conscious experience. However, this is all moot if we do not produce researchers who are trained in the use of qualitative methodology. Studying consciousness by using integrative methods will only be possible if we incorporate qualitative methodology into our undergraduate curricula. Then, if the next generation of researchers

falls back on what they are most comfortable with, they will at least have a wider palette of research designs and techniques to draw from than those who were trained purely in quantitative methodology.

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Table 1

A Survey of Required Statistics and Research Methodology Courses in Undergraduate Psychology Programs at the Top 50 National Universities and Colleges

University or College	Undergraduate Psychology Programs Statistics and Research Courses Required for the Major ^a		
	Statistics	Quantitative Research	Qualitative Research
1. Harvard University	Yes	Yes	No
2. Princeton University	One course is required that combines statistics and research methods		No
3. Yale University	Yes	Yes	No
4. Columbia University	Yes	Yes	No
5. California Institute of Technology ^b	N/A	N/A	N/A
6. Massachusetts Institute of Technology	Yes	A laboratory course and a research course are required	No
7. Stanford University	Yes	No	No
8. University of Chicago	Yes	A research methods course is required that combines quantitative and qualitative methods	
9. University of Pennsylvania	Yes	Yes	Yes, if the student takes a Research Experience class that involves qualitative methods
10. Duke University	Yes	Yes, students are required to take Research Methods in Psychological Science or a Laboratory course	Yes, if the student takes a laboratory course that deals with qualitative methods
11. Dartmouth College	No	Yes	No
12. Northwestern University	Yes	Yes	No
13. Johns Hopkins University	Two statistics courses are required	Yes	No
14. Washington University in St. Louis	Yes	Yes	No
15. Brown University	One course is required that combines statistics and research methods		Yes, but only if the student's required laboratory course incorporates qualitative methodology
16. Cornell University	One course is required that combines statistics and		

	research methods		No
17. Rice University	Yes	Yes	No
18. Vanderbilt University	Yes	Yes	No
19. University of Notre Dame	Yes	Yes	No
20. Emory University	Yes	Yes	No
21. University of California, Berkeley	Yes	Yes	No
22. Georgetown University	Yes	Yes	No
23. Carnegie Mellon University	Yes	Two research methods courses are required Additionally, students take an Experimental Psychology course	Yes, if either of the student's research methods courses focuses on an area in psychology that uses qualitative methodology
24. University of Southern California	Two statistics courses are required	Two research methods courses are required along with one course in experimental methods	One course in non-experimental methods
25. University of California, Los Angeles	Yes	Yes	No
26. University of Virginia	A two course sequence is required. Each course combines statistical analysis and research methods		No
27. Wake Forest University	A two course sequence is required. Each course combines statistical analysis and research methods		No
28. University of Michigan, Ann Arbor	Yes	Two research courses are required	Yes, if one of the research methods courses covers an area in psychology that uses qualitative methods
29. Tufts University	Yes	Experimental Psychology and a laboratory course are required	Yes, if the laboratory course includes description of qualitative methods
30. University of North Carolina, Chapel Hill	Yes	Yes	No
31. Boston College	A two course sequence is required. Each course combines statistical analysis and research methods		No
32. Brandeis University	Yes	Two research courses are required	Yes, if the student's second research course includes qualitative methods
33. College of William and Mary	Yes	Yes, an Experimental Psychology and an Advanced Research course are required	Yes, if the student's Advanced Research course covers qualitative methods
34. New York University	Yes	Yes, a Laboratory Course is required	Yes, if the student's Laboratory course covers qualitative methods
35. University of Rochester	Yes	Yes, students in the Brain and Cognitive Sciences program are required to take a Laboratory course Students in the Clinical and Social Sciences	No

		program are not required to take a Laboratory course	
36. Georgia Institute of Technology	Yes	Yes A Research Methods course is required, Experimental Psychology is required, and a capstone in Applied Experimental Psychology is required	No
37. University of California, San Diego	Yes	Yes	No
38. Case Western Reserve University	No	Yes	No
39. Lehigh University	Yes	Yes	No
40. University of California, Davis	Yes	Yes	No
41. University of Miami	Yes	No	No
42. University of California, Santa Barbara	Yes	Yes	No
43. University of Washington	Yes	Yes, a research course and a laboratory course are required	Yes, if student's laboratory course involves qualitative methods
44. University of Wisconsin, Madison	Yes	Yes	No
45. Pennsylvania State University, University Park	Yes	No	No
46. University of California, Irvine	Yes	Yes	No
47. University of Illinois, Urbana Champaign	Yes	Yes, a Laboratory/Research Methods course is required	Yes, if the Laboratory/Research course covers qualitative methods
48. University of Texas, Austin	A course is required that incorporates statistics and research methods		No
49. Yeshiva University	Yes	Yes, an Experimental Psychology course is required	No
50. George Washington University	Yes	Yes	No

Note. List of schools from "Best Colleges 2012: National University Rankings" by US News & World Report.

^aThese courses are required by each Psychology Department. Courses in mathematics, statistics, or quantitative reasoning courses that each university requires as part of their general education requirements are not listed.

^bThis university does not have an undergraduate psychology program.