

Social Psychology: Research Methods

Lia Figgou, Aristotle University of Thessaloniki, Thessaloniki, Greece

Vassilis Pavlopoulos, National and Kapodistrian University of Athens, Athens, Greece

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Abstract

This article presents some of the issues attached to the research methods used in Social Psychology. First it introduces the different methods used in social psychological research (quantitative and qualitative) and discusses the basic epistemological assumptions that lie on the basis of each of them. Then it presents methods of generating/collecting data and techniques of quantitative and qualitative data analysis. Finally, it briefly discusses issues related to validity and reliability of qualitative and quantitative research in Social Psychology and highlights the importance of addressing social psychological questions through the use and analysis of empirical data.

Over the years researchers identifying their research as social psychological have used a variety of methods to answer their research questions. These can be categorized as quantitative (experimental and nonexperimental) or qualitative (analytic techniques employed to analyze data generated through interviews and focus groups discussions, but also naturally occurring data). Although the division between qualitative and quantitative research methods coincides with debates about Social Psychology as a discipline, here we take the stance to present the different methods in a single article, highlighting their epistemological differences but assuming that both types of methods characterize the discipline. We will briefly present the methods, their epistemological foundations, and the questions they imply, and then we will present some techniques of generating and analyzing data. The article starts alphabetically from qualitative research methods and then moves to quantitative research.

Qualitative Research Methods in Social Psychology

The term 'qualitative research methods' is employed (1) to describe ways of generating and analyzing data which are not reducible to numbers (more often than not, texts and less frequently visual material) and (2) to refer to a broader framework within which certain epistemological and ontological assumptions prevail (Clarke and Braun, 2013). While in some cases qualitative research is used as a forerunner of quantitative research (analysis of interviews or focus group discussions often constitutes a first step toward the construction of a survey questionnaire) or as part of a mixed-methods research design, in other cases the choice of qualitative methods reflects a specific way of understanding social psychological phenomena and social psychological knowledge (see Social Constructionism).

The expansion of qualitative methods is, more often than not, related to the 'crisis' debates of the 1970s that included a critique on social psychological method(s) (see Critical Psychology). However, it is not until the late 1980s and 1990s that qualitative methods gained a foothold in Social

Psychology, as a consequence of the development of post-modernist and post-structuralist perspectives and the so-called 'discursive turn' (see Social Psychological Theory, History of). Some basic principles of qualitative research – although different approaches do not share the same level of commitment to them – include the following: (1) a focus on meaning and interpretation, (2) a preference for inductive, theory-generating research, (3) sensitivity to the situated, context-specific nature of meaning, and (4) recognition that researchers' perspectives and subjectivities are intrinsically involved into the research process (something that in quantitative research is termed bias and it is treated as an unwelcome weakness). These qualitative methods are also used in other social science disciplines, especially in anthropology, cultural psychology, and cross-cultural psychology.

Methods of Collecting/Generating Qualitative Data

Interviews

Interviewing constitutes probably the most common and popular qualitative data collection technique. It normally involves a 'dialogue' with the researcher setting the agenda and asking questions and the interviewee being cast in the role of respondent. Nevertheless, interviews as a specific type of dialogue can be more or less structured. In structured interviews – rarely used in qualitative research – both the wording and the order of the questions are the same from one interview to another. In unstructured interviews, on the other hand, a free-flowing conversational style is adopted and respondents are encouraged to raise issues not originally included in the interview schedule. Biographical interviews which aim at the elicitation of research participants' personal stories with minimum researcher prompting constitute a paradigmatic example of unstructured interviews. Finally, in semistructured interviews, which are most commonly used in qualitative research, the researcher sets the agenda on the basis of their own interests and topics, but allows room for the participants' more spontaneous descriptions and narratives. Other distinctions are between one-to-one versus group interviewing, face-to-face versus

telephone interviewing or interviewing through the Internet (Madill and Gough, 2008).

Focus Groups

Focus groups constitute researcher/moderator-led group discussions designed to extract opinions about a topic. They have been originally developed in market research, but they gradually became a popular data generating method in academic research and especially in research projects that involve previously unexamined topics (Krueger and Casey, 2000). Focus groups provide a context which allows for the development of argumentation and counterargumentation and for the exploration of the interactional mechanisms involved in sense making. They are also considered a method appropriate to study groups whose voices are often marginalized within the larger society.

Interviews and focus group discussions are usually audio-recorded – researchers who intend to take into account nonverbal aspects of communication in their analyses tend to video record their interviews – and then transcribed. Transcription is a laborious task and demands prolonged practice. It is also an interpretative process that requires sensitivity on the part of the researcher to the nuances of oral speech and its differences to written language.

Naturally Occurring Data

This category includes a range of texts and interactions produced in the course of everyday life. The researcher is actually involved only in the sampling of the material. The virtues of using naturally occurring data are usually highlighted through their comparison to the artificiality of research interviews. According to critiques (Potter and Hepburn, 2005) an interview is carried out to serve the researcher's ends and agendas, which are external to the conversation itself and (potentially) irrelevant to the participants' interests. Naturally occurring data include archival documents (ranging from television programs and Internet materials to official/institutional archival data such as health records), naturally occurring conversations (therapy sessions, telephone calls recorded in the normal course by service providers) and – less frequently – visual material such as photographs or murals.

Observation

It has formed the basis for much qualitative research. In common with the category of naturally occurring data it is appropriate for the study of behavior that cannot be produced in an artificial environment for practical or even ethical reasons. Among its advantages is that it allows researchers to understand processes, to understand social life as involving interrelated series of events. Different types of observation are constructed on the basis of criteria such as the extent to which researchers intervene in the phenomenon of study or interact with research participants (Silverman, 1993). Structured observation refers to a situation where the researcher creates the context where a behavior can occur. Systematic observation involves a trained researcher who observes and codes the phenomena of study according to a pre-arranged set of criteria. Participant observation refers to a form of systematic observation whereby the observer interacts with the people being observed. Ethnography is a type of observational method used initially by cultural anthropologists and more

recently by social psychologists to study and understand a group or culture. Ethnographic observation involves participation in a cultural-social context over a lengthy period of time.

Structured Methods of Data Collection

Sometimes qualitative research in Social Psychology may use more structured methods of data collection (also often used in quantitative research) such as open-ended questionnaires, Q-methodology and repertory grids, protocols (verbal or written records of observations or experience, obtained in response to a standardized question) designed, or vignettes (a scenario is provided for participants to consider and answer questions).

Methods of Qualitative Data Analysis

Qualitative Content Analysis

Content analysis is basically a quantitative method that involves establishing categories and counting the number of instances that these categories appear in a corpus of data. However, the method is also employed in qualitative research in which systematic classification procedures are used to categorize qualitative textual data into clusters of meaning (categories or themes). Qualitative content analysis is more interpretative in comparison with its quantitative counterpart and it is interested not only in the 'manifest' meaning of words or phrases but also in its 'latent' underlying meaning (Mayring, 2000). Coding systems consist of rules for assigning specified units into categories. Normally, categories are intended to be unidimensional, exhaustive, and mutually exclusive, but this is not always the case in qualitative content analysis (a piece of text may be relevant to more than one category). The implementation of content analysis has been drastically affected by the development of software packages, such as NVivo, Atlas ti, Dedoose.com, and the recently developed QCMap. These tools can assist the researcher in handling and organizing large quantities of data but they cannot diminish the need for intellectual effort on the part of the analyst. Content analysis can be applied to a whole variety of data (including nonverbal data, such as pictures, drawings, gestures, etc.) and in relation to a variety of research questions. The fragmentation of texts and the decontextualization of data (as instances, pieces of text or answers are separated from their contexts) constitute potential disadvantages of the method.

Grounded Theory

A methodological approach was first developed by the sociologists Glaser and Strauss (1967). Glaser and Strauss criticized research derived from highly abstract theories that it fails to come up with explanations that are of relevance to those being studied. Hence, they developed a method aiming to generate a local, contextual theory, grounded on data. Therefore, the term grounded theory refers both to a method of inquiry, as well as to the theory produced by the implementation of method. The method includes an initial coding phase in which researchers work systematically through the data corpus generating codes (analytic labels) to describe both low-level concepts, as well as, more abstract categories. Throughout the process, they write memos elaborating their codes, identifying analytic gaps, and comparing analytic categories. Constant comparison and theoretical sampling constitute principal

analytic tasks of the method. Constant comparison involves continually comparing elements (analytic categories and theoretical presuppositions), while theoretical sampling involves the active sampling of new data that inform theoretical categories as the analysis proceeds. The emphasis of the original grounded theory method on *discovering* theory from data with its empiricist connotations was criticized by scholars who emphasized the constitutive nature of the analysis and developed more social constructionist revisions of the method (Charmaz, 2006).

Thematic Analysis

There is no agreement if it really constitutes a specific method in its own right. It is often rather unclear which its differences with qualitative content analysis are, and its use has been fairly inconsistent (see, however, Braun and Clarke, 2006; for a systematic introduction to the method). Thematic analysis also involves (usually inductive) coding of qualitative data into clusters of similar entities, or conceptual categories and the identification of consistent patterns and relationships between themes, so as to come up with a theoretical explanation of the phenomenon under study.

Interpretative Phenomenological Analysis

Its central focus is on the understanding of subjective experience and on the meaning attached by participants themselves to their lived experience. Unstructured or semistructured interview data are considered to be the ideal path to the participants' subjectivity. In terms of initial coding and the process of identification of emergent themes within the corpus of data Interpretative Phenomenological Analysis is also very close to some versions of thematic analysis and grounded theory (Smith et al., 2009).

Narrative Analysis

Narrative analysis refers to a cluster of analytic methods for interpreting texts or visual data that have a storied form. A common assumption of narrative methods is that people tell stories to help organize and make sense of their lives and their storied accounts are functional, and purposeful. Different approaches to narrative analysis are categorized on the basis of whether they focus on the narrative content or structure, with the thematic version interrogating what a story is about, while the structural version asks how a story is composed to achieve particular communicative aims. To this basic typology, according to Kohler Riessman (2008), one could also add the dialogic/performance narrative analysis, which focusses on the context and view of narratives as being multivoiced and coconstructed and the visual which links words and images in a coherent narrative.

Discursive Methods (Discourse Analysis/Discursive Psychology)

There are a variety of related – but also fundamentally distinct – methods grouped under the rubric 'discursive' or, most commonly, 'discourse analysis.' What is common between different methods is the recognition of the vital role of discourse in social life and an approach to language as social practice, instead of a pathway to inner cognitive entities (*see* Social Constructionism). Nevertheless there is little consensus

between approaches on the ancestors and the epistemological basis of the analysis, on the analytic objectives, and on the conceptualization of the very notion of *discourse*. Potter and Wetherell (1987) – influenced by speech act theory, ethnomethodology, semiology, and post-structuralism – used the term 'discourse' to refer to virtually any language use and considered interpretative repertoires (recurrently used units of content, situated in certain – usually interview – contexts and oriented toward different interactional but also macro-social functions) as the units of analysis. On the other hand, scholars influenced by Foucault's work defined discourse as "a system of statements which constructs an object" (Parker, 1990: 191) and tended to fracture texts into discrete discourses which subjectify speakers and reproduce power relations.

The early 1990s witnessed also the emergence of discursive psychology (Edwards and Potter, 1992) which is informed by conversation analysis (CA) and prioritizes the use of naturalistic data. Its focus is on the role that descriptions of the world (including descriptions of psychological states) play in the management of speakers' accountability and in the formation of action. In the years to come, discursive psychologists became more deeply engaged with CA, working with conversational corpora from everyday and institutional settings, transcribed by the use of conventions developed by Gail Jefferson. Between the boundary lines among this strand of work, which affiliates with ethnomethodological traditions, and analytic perspectives which follow Foucaultian lines, other scholars proclaimed (Wetherell, 1998) an eclectic engagement with both CA and post-structuralism (and therefore engagement with both the interactional as well as the broader ideological functions of language use) as the most productive starting point for discursive methods in Social Psychology. This approach is known as critical discursive psychology.

Conversation Analysis

CA refers to a specific approach to the analysis of interaction that emerged in the 1960s in the work of Harvey Sacks (Sacks, 1995). CA is interested to understand social order by focusing analytically on the sequence of talk in interaction and on the ways participants organize mundane conversation. The recent engagement of discursive psychologists with CA blurs the boundaries between the two as analytic methods in Social Psychology.

Rhetorical Analysis

Interest in rhetoric in Social Psychology also arose as part of the discursive turn. Key text through which rhetoric was introduced in social psychological analyses constitutes Billig's (1987) *'Arguing and Thinking.'* Given his preference for scholarship, instead of methodology, Billig did not intend to introduce an analytic method in the narrow sense of the term. The text did not adhere to any specific methodology and neither included any methodological guidelines. Nevertheless, it served to deepen and enrich the understanding of how to approach analytically context and content in qualitative research, by advocating the need to consider the rhetorical relation between topics (as units of analysis). According to Billig (1987), in order to capture the meaning of any commonplace assumption, we should put it in

its argumentative context and examine it in relation to the commonplace that it aims to downgrade. Rhetorical analysis is also interested in relating meaning, or rather disputes over meaning, to the broader historical ideological context.

Validity and Reliability in Qualitative Research

There is considerable debate regarding the extent to which validity and reliability criteria – which have been defined in quantitative research and are imbued with its assumptions – are appropriate to evaluate the *quality* of qualitative research. According to some authors, qualitative researchers can and should incorporate criteria and techniques that deal with issues of reliability and validity and adjust them in their own epistemological framework. Silverman (1993), for example, maintained that triangulation techniques (of researchers or/and of data sources) can vitally contribute to the quality of research inquiry and can be compatible with the constructionist epistemology that underlies many qualitative research methods, if they are considered as highlighting the situated use of different accounts, instead of being treated as a means to prioritize one account vis-à-vis others.

Other researchers, however, prefer to replace validity and reliability with terms and criteria more compatible to the interpretivist background of qualitative research. Potter and Wetherell (1987) suggested *coherence* of the analytic framework (the potential of the analytic framework to give coherence in a body of data by accounting both for regularity and variability within it), *fruitfulness* (the extent to which the analytic scheme generates novel explanations), *new problems* (the identification of contradictions and exceptions from the explanatory scheme that necessitates new analytic questions and answers), and *participants' own orientation* (the way in which participants themselves see what analysts may consider as consistent, contradictory, etc.) as validation criteria of discourse analysis. Interest in understanding the phenomena from the participant's view as a validation criterion of the quality of the analysis has been developed also in other methods. Grounded theorists, for example, also maintained that the extent to which results may be recognizable and may be of relevance to those studied constitutes a vital criterion of research quality. Finally, a usually mentioned criterion of qualitative analysis's validation concerns the extent to which researchers' reflexivity is built into the analytic process.

Quantitative Research Methods in Social Psychology

Quantitative research is one that relies primarily on information of quantitative (i.e., numerical) nature. It conceptualizes reality in terms of variables, which measures and explores by applying statistical techniques in order to study relationships between them (Punch, 2014). Quantitative research is considered a 'top-down' approach in the sense that specific hypotheses deriving from a theory are tested through data analysis. Following the epistemological tradition of determinism, according to which events are accounted for by one or more causes, it assumes that behavior is explainable. Therefore, quantitative researchers try to make probabilistic predictions and generalizations by identifying cause-and-

effect relationships. Supporting the ontological claim of objectivity, they strive to remain neutral and study the phenomena of interest 'from a distance,' which is expected to ensure validity of measurement and replicability of their findings (O'Dwyer and Bernauer, 2014).

As an empirical science, Social Psychology attempts to answer questions of quantitative nature about human behavior by testing hypotheses both in the laboratory and in the field. This corresponds to the distinction between experimental versus nonexperimental/correlational research designs. Although sometimes presented as essentially different or even incompatible, the difference between the two methods may be preferably understood in terms of the level of control exerted over the variables under study (Tajfel and Fraser, 1978).

Methods of Collecting/Generating Quantitative Data

Experimental

Although social psychologists employ a variety of methods to explore their research questions, the experimental paradigm has largely dominated the field, being characterized as the workhorse of Social Psychology (Wilson et al., 2010). An experiment involves measuring the effect of different conditions, intentionally manipulated by the researcher, on a behavioral outcome of interest. The former constitute the levels of an independent variable, while the latter is referred to as dependent variable. Not surprisingly, experiments are usually conducted in laboratory settings, which offer maximum control over the independent variable and minimal intrusion of third factors, thus allowing for testing hypotheses regarding causal effects.

The main advantage of an experimental design relies exactly on the ability to ensure all three preconditions for establishing causality, namely temporal precedence, covariation of the cause and effect, and exclusion of alternative plausible explanations (Trochim and Donnelly, 2007). This is not a simple task though: researchers must be careful to randomly assign individuals across the experimental conditions, to disentangle confounded variables, to avoid extreme conditions (that would lead to floor or ceiling effects), to exclude demand characteristics of experimental settings (that would lead to biased responses of participants), and to favor experimental versus mundane realism, i.e., 'true' psychological impact versus intrusive effect of everyday encounters (Hogg and Vaughan, 2010).

On the other hand, having enough control over the experimental conditions usually implies that the results cannot be generalized to everyday life, which means that there is a trade-off between internal and external validity. This can be dealt with by conducting field experiments, where experimental conditions are manipulated in real-life settings. However, some researchers warn that field experiments do not actually increase external validity as findings may or may not generalize to different real-life settings (Dipboye and Flanagan, 1979). Beyond the issue of validity, it may not be ethically acceptable or even possible for researchers to perform controlled experiments. In such occasions, nonexperimental methods are employed in order to collect quantitative data.

Nonexperimental

Quantitative nonexperimental methods refer to correlational studies, which focus on the naturally occurring associations among two or more factors. The use of advanced statistical software gave a boost in the number of variables, as well as in the complexity of the relationships, that can be examined simultaneously in a correlational study (see the next section). However, one should always bear in mind that any correlation-based technique, no matter how sophisticated, cannot determine causal effects. To compensate for reduced internal validity, the enhanced external validity associated with nonexperimental designs contributes to the development of social psychological theory by providing robustness (i.e., replicability of findings), representativeness (i.e., real-world processes), and social relevance (Brewer, 2000).

The most common method of data collection in a nonexperimental design is a survey study. Related developments – most notably, the widespread use of information technology – have broadened the range of choice of researchers to include techniques such as Internet research, diary methods, ambulatory assessment, and trace measures (see Reis and Gosling, 2010). These are briefly introduced below:

Survey

In quantitative studies, survey data are usually collected through the administration of self-report scales or questionnaires using the paper-and-pencil method. Surveys can obtain a large amount of information from a large number of participants in a short period of time. The psychometric properties (i.e., reliability, validity) of the measures, random sampling (in order to maximize representativeness of the general population), respecting the code of ethics (e.g., informed consent, anonymity, and confidentiality of responses), and – of course – implementing the appropriate statistical techniques are some key-issues to a successful survey. The numerous types of attitudes and values research are typical examples of survey studies.

Diary Methods

Diary studies adopt a within-subject approach by collecting repeated measures from the same number of participants at different time points. They are designed to capture life in real-world settings. Their use became more popular along with the development of multilevel statistical software, such as Hierarchical Linear Model (HLM) (see below). Topics of interest in diary studies are, among others, personality traits, emotions, social interaction, marital and family interaction, stress, and subjective well-being.

Ambulatory Assessment

This refers to the use of mechanical or electronic devices that record information about an individual's activity or state in natural, everyday settings. Some applications include ambulatory cardiovascular monitoring, electronic recording of the acoustic environment, activity monitoring, and location mapping (Reis and Gosling, 2010).

Internet Research

Initiated in the 1990s as a convenient means to increase the number of participants, complementary to the traditional paper-and-pencil method, the Internet soon became a new,

dynamic, rapidly growing field of research. Of special attention are phenomena unique to the virtual environment, such as personal Web pages, forums, and the various forms of social networking (e.g., Facebook, Twitter, etc.). At the same time, a number of concerns have been raised against Internet studies, focusing on issues such as the characteristics of participants, the potentially fake identity of responders, or the reduced replicability and generalizability of findings compared to other methods. Although some of these issues have been addressed (e.g., Gosling et al., 2004), the physical distance between researcher and participant remains a major drawback and, at the same time, a distinctive advantage of Internet research.

Trace Measures

These studies are based on the fact that certain social behaviors, attitudes, cognitions, and emotions leave physical traces. Although Reis and Gosling (2010) accept that the environmental evidence of social psychological behaviors is largely untapped by researchers, they stress the potential value of trace measures, as the manifestations of an individual's thoughts, emotions, and actions go beyond physical environments.

Methods of Quantitative Data Analysis

Statistical methods are important tools for social psychologists in order to explore their research questions or examine specific hypotheses. These tasks typically correspond to the distinction between exploratory and confirmatory data analysis introduced by Tukey (1980), who wisely warned that confusing the two types of analysis can lead to systematic bias due to issues inherent in testing hypotheses suggested by the data. However, as Judd and Kenny (2010) point out, most data analysis in Social Psychology is essentially confirmatory, in the sense that researchers are guided by overtly or implicitly causal theories they seek to confirm. These models often include both direct and indirect effects; they may also expand to incorporate different levels of explanation, such as the intrapersonal, the interpersonal, the positional, and the ideological (Doise, 1986). In order to understand such complex relations in their data, researchers are supported by recent developments in advanced statistical techniques, such as structural equation modeling (SEM) and multilevel modeling (MLM), usually implemented by powerful software. In the following, these developments in quantitative data analysis will be briefly presented with respect to two issues of core importance in social psychological research, namely causal modeling and levels of analysis.

Causal Modeling

A causal model represents the relations between a given set of variables. It can take the form of a statistical equation and it is usually graphically depicted. SEM is in fact an extension of regression analysis for testing and estimating causal relations, which also allows for inclusion of latent constructs represented by a number of measured variables. The existing, constantly evolving SEM statistical software, such as AMOS, EQS, LISREL, and Mplus, providing powerful controls in what concerns model testing, modeling error, treatment of missing data, and testing invariance across multiple groups.

Causal models guide social psychological research by setting the ground for building and testing specific hypotheses.

Statistical handling of data collected within this framework can be quite complicated as it may include multiple variables and their relations are examined simultaneously in a number of combinations, which goes far beyond the traditional analysis of variance (ANOVA) and multiple regression techniques. Even in simple experimental designs as well as in nonexperimental correlational studies, research hypotheses may refer to indirect effects, which involve the inclusion of third variables explaining or modifying the relations between an independent factor and an outcome. Baron and Kenny's (1986) seminal work discussed in depth the conceptual, strategic, and statistical considerations of distinguishing between two types of third factors affecting a causal relation, i.e., the mediator and moderator variables.

Mediation

A simple mediation model suggests that the observed relation between an independent variable and an outcome can be explained by the effect of a third factor, known as mediator. According to Baron and Kenny (1986), three prerequisites are necessary in order to establish mediation: (1) the independent variable should be a significant predictor of the dependent variable; (2) similarly, the mediator should have a significant effect on the dependent variable; and (3) the mediator should be a significant predictor of the dependent variable while controlling for the effect of the independent variable. A relation is *fully mediated* when the direct path from the independent variable to the outcome becomes nonsignificant after accounting for the effect of the mediator. *Partial mediation* occurs when the mediator accounts for some, but not all, of the relation between the independent variable and the outcome. The amount of mediation is called the *indirect effect*.

A simple, common technique to identify mediation is Sobel's test (1982), which compares the difference in the relation between the independent variable and the outcome before and after inclusion of the mediator in the regression equation. More recently, Preacher and Hayes's (2008) nonparametric bootstrap method has become increasingly popular, which is recommended for small samples as it does not violate assumptions of normality. SEM programs or especially written statistical software macros can be applied in order to test for complex cases of mediation, such as multiple independent factors or outcomes, multiple mediators or latent variables used as mediators (see, for example, the Web pages of Andrew Hayes, <http://www.afhayes.com/>, and Kristopher Preacher, <http://www.quantpsy.org/men.htm>).

Beyond statistical complexity, it should be underlined that mediation is primarily a conceptual issue, i.e., the conclusions from a mediation analysis are valid only if the causal assumptions hold true (Judd and Kenny, 2010). Therefore, researchers should make sure that reverse causal effects (e.g., the mediator being caused by the outcome) or confounding variables (i.e., factors causing both the mediator and the dependent variable) are not present. Also, the mediator should be reliably measured in order to minimize bias.

Moderation

If mediation analysis attempts to explain 'how' or 'why' an effect occurs, moderation refers to the question of 'when' this effect holds, i.e., if the strength and/or direction of the relation

between two variables is affected by the presence of a third variable, known as the moderator. Moderation suggests that the characteristics of the relation between an independent factor and an outcome vary at different levels of a moderator, while mediation suggests that the relation between an independent factor and an outcome is fully or partially explained by a mediator. Statistically speaking, moderation represents an interaction or a product in factorial ANOVA or in multiple regression, depending on whether the moderator is qualitatively or quantitatively measured, respectively (see Hayes and Matthes, 2009; for computational procedures of calculating interaction terms). From a conceptual point of view, hypotheses involving moderation address the question of invariance of causal relations between an independent variable and an outcome across different units, such as persons, situations, or cultures. In fact, any causal assumption implies some degree of invariance across persons. Judd and Kenny (2010) remind us of other sources of invariance including time points, situations, experimental stimuli (e.g., evaluative priming procedures), specific statistical techniques (e.g., meta-analysis, logistic regression), and cross-cultural comparisons. Invariance indicates the replicability of our findings and the limitations in generalizing our conclusions. In methodological terms, moderation analysis provides evidence of external validity as it examines to what extent a causal effect is considered universal.

Statistical handling of data in moderation analyses goes beyond simple identification of a significant partial effect of a product predictor in a linear model. Common problems include, among others, multicollinearity and power. Multicollinearity may yield coefficients with higher standard errors since the interaction term of two continuous variables (i.e., the moderator) inevitably correlates highly with the two main effects used to calculate it. Low statistical power indicates that replication of a significant moderation effect is difficult to achieve, especially with continuously measured independent variables, and calls for the use of large sample sizes.

In addition to the assumptions for applying specific statistical procedures, Judd and Kenny (2010) elaborate on some more perplexing issues of moderation testing. Not surprisingly, their discussion raises the problem of causality from a theoretical perspective once again. They show that the direction of causality between A and B (i.e., the decision on which variable will be treated as independent or outcome) matters a great deal in moderation testing, especially when the homogeneity of variance assumption is violated, so that A or B vary differently at high and low levels of the moderator. In such statistically ambiguous situations, a solid causal theory is necessary to indicate how moderation is assessed.

Mediated Moderation and Moderated Mediation

It is not rare that both mediator and moderator variables are integrated in a causal model. In these cases different hypotheses can be drawn, which are extensions of the simple mediation and moderation frameworks and they are defined accordingly. In *moderated mediation*, the mediating effect of a variable in the relation between an independent factor and an outcome varies across different levels of a moderator (Preacher et al., 2007). In *mediated moderation*, the effect of a variable moderating the relation between an independent factor and an outcome is accounted by the mediating process of another variable (Muller

et al., 2005). Therefore, moderated mediation and mediated moderation do not necessarily imply the existence of two different data sets, but rather two different causal models guiding research hypotheses, which can be based on the same data set.

Although mediation and moderation analyses are quite common in social psychological research literature, mediated moderation and moderated mediation hypotheses are not frequently examined, which would be particularly informative in extending the theoretical models used. This may be due to the statistical complexity of such questions, as computational routines to conduct these analyses are only recently being developed. Fairchild and MacKinnon (2009) provide illustrated examples of the equations required to simultaneously estimate mediation and moderation effects; they also underline the contribution of these techniques in applied settings, where the questions of 'how' and 'for whom' an intervention program is effective become crucial.

Modern SEM computer programs, with their user-friendly graphical interface and huge estimating capabilities, facilitate the conceptual and statistical handling of mediation and moderation analyses, provided that researchers are respectful with regard to consideration of assumptions (see Bentler and Chou, 1987; for an excellent overview). Testing of alternative models on the grounds of goodness-of-fit indices is particularly enlightening in terms of theory building. For example, longitudinal designs may benefit from examining four competing hypotheses referring to stability, causality, reversed causality, and reciprocal causality, respectively. Yet, it should be reminded that SEM is a confirmatory – as opposed to exploratory – technique, which means that it can be used to compare multiple theories that are specified a priori.

Levels of Analysis

Although many social psychological theories focus on individual processes, they are inherently placed at the interface between personal and group phenomena; therefore, hypotheses drawn on these theories may include multiple levels of analysis. The term *MLM* – which is a shortcut for *multilevel random coefficient modeling*, also known as *hierarchical linear modeling*, among others – is used to describe hierarchically structured data, i.e., observations at one level which are nested within observations at another level. For example, employees (L1) are nested within departments (L2) and organizations (L3); students (L1) are enrolled to different classes (L2) and schools (L3); in cross-cultural studies, individuals (L1) come from different countries/cultures (L2); in diary studies, emotions at different events or time intervals (L1) are nested within persons (L2). As Kreft and de Leeuw (1998) put it, once we realize hierarchies exist, we recognize them everywhere!

In statistical terms, the key question is whether observations are independent or not. In hierarchically structured data observations at L1 are not independent, which violates a fundamental assumption of traditional ordinary least squares (OLS) techniques, such as ANOVA and regression. Single-level analyses that ignore the hierarchical structure of data may provide misleading results because relations at different levels of analyses are in fact independent. Van de Vijver and Poortinga (2002) provide a taxonomy of multilevel fallacies occurring when different patterns of relations across levels are ignored.

Additionally, in social psychological research inferences are made for a unit of analysis by studying random samples. MLM takes into account simultaneously the sampling error at different levels, which is not the case with traditional OLS. Therefore, MLM produces more accurate estimates than OLS because it considers the reliability of scores and the differences in sample sizes. These advantages are pronounced when hypotheses of interest concern within-unit relations, and when the data structure is irregular, for example, due to missing data (Nezlek, 2008).

MLM is appropriate when research questions involve more proximal (L1) and more distal (L2, L3...) factors influencing individual behavior, or simply when the data are hierarchically structured. Two issues of relevance need to be considered here: (1) the nature of the variables used; and (2) the nature of the relations between levels. Variables in a multilevel model may be intrinsic or derived (either aggregated or disaggregated; see Van de Vijver and Poortinga, 2002). The latter case raises concerns about equivalence, i.e., to what extent a construct measured in different groups has the same underlying structure. Structural equivalence is a precondition in order to perform group mean comparisons. It can be examined by calculating a congruence coefficient (e.g., Tucker's phi) through exploratory multilevel factor analysis procedures, or by applying multilevel confirmatory factor analysis with the use of SEM programs. Another question of interest is to what extent the same pattern of predictor–outcome relations holds across L2 units, e.g., across groups, cultures, or time points. This is typically referred to as a cross-level interaction. Conceptually similar to moderation, it is substantive for social psychologists who seek to explore the interplay between different levels of explanation (Doise, 1986) and can be examined through specialized statistical software (HLM).

Some Additional Comments

Error

Dealing with error in quantitative data analysis is almost as important as model testing. Although relevant assumptions (such as lack of measurement error and homogeneity of error variance) are embedded in OLS analyses, researchers sometimes tend to overlook them. Violation of these assumptions may lead to unfortunate conditions, such as measurement bias, attenuation of measures of association, reduced power in testing interactive effects, and underestimation of mediation effects, among others (Baron and Kenny, 1986). Therefore, obtaining reliable measures, identifying outliers, testing for nonnormality, and treating sources of error at different levels are necessary steps to be taken prior to any analysis involving specific hypothesis testing.

Variable Coding

In a regression equation, the parameter estimate of a predictor indicates the effect of the predictor on the criterion variable when all other predictors equal zero. Therefore, all simple effects are meaningless if zero is not a meaningful value for the predictors included in a regression model. This straightforward statement is not always fully understood by researchers, thus leading to a series of misinterpretations. When a categorical predictor is coded as 1 versus 2, then the slope of a continuous independent variable points to a nonexistent level of the

categorical predictor. An easy solution for this problem is to use a coding of 0 versus 1. Even in that case, the slope of a continuous independent variable is not a 'main effect,' as presented by many, but rather the simple effect of that independent variable when the categorical predictor equals zero.

In the same underlying rationale, when calculating the product for a regression interaction term it is advised that the two component variables are centered prior to computing their product, so that zero is an interpretable value for both predictors (Aiken and West, 1991). Of course the above is not necessary if zero is already a meaningful value, like for example, in Likert scales coded from -3 to $+3$, instead of $1-7$. In multilevel models, variable centering can affect significance tests, but most dramatically it changes intercepts and error terms (Kreft and de Leeuw, 1998). HLM software provides two centering options (in addition to the uncentered solution), namely grand mean centering and group mean centering, depending on whether the slopes represent deviations from the overall mean or from each group's mean, respectively. With grand mean centering, estimates of slopes include between group differences in means of predictors, which are not included in group mean centering. At L2 (in two-level models), it is preferred to grand mean center, as this helps interpreting the intercept. At L1, group mean centering is closest to conducting within group regression analysis.

Missing Data

Missing data are quite underestimated by researchers. In any paper describing a quantitative statistical method there is a section devoted in how to treat missing values, often skipped by some readers. However, the presence of missing observations may have important implications, from restricting the generalizability of the findings to practically preventing an analysis from running at all. A typology describing missing data in terms of their underlying cause is owed to Rubin (1987): missing completely at random, missing at random, and missing not at random. The strategies for handling missing data include case (listwise) deletion, imputation by using a substitute value (such as the group mean or a multiple regression estimate), and multiple imputation (a method that estimates the sampling variance due to imputation). These strategies differ in terms of sophistication, which in turn attempts to compensate for their disadvantages. Therefore, they should be studied carefully before being applied in a given data set through modern powerful statistical software.

Judd and Kenny (2010) urge social psychologists to be more creative in how they deal with missing data, which they believe can lead to new insights about their research designs. Overall, perceiving statistical analyses as a challenging opportunity to discover rather than a routine of imposed restrictions will help researchers get the most out of their data and improve their theories.

Conclusion

In this article, we presented the methods used by social psychologists in order to set and address research questions, to generate and analyze empirical data, and to contribute to social

psychological knowledge. We devoted space both to qualitative and quantitative research and we attempted to highlight not only the differences between them but also the diversity within each research tradition. Of course many supporters of each tradition would disagree about the extent to which a pluralistic stance toward method is preferable or even acceptable, although a *mixed-methods* research approach combining the quantitative and qualitative typologies is gaining ground in recent years (e.g., Bryman, 2006). In any case, it is hard to disagree that the diverse ways of generating and analyzing empirical data and the importance attributed to this process has given Social Psychology as a discipline a distinctive identity among the social sciences.

See also: Anthropology: Overview; Attitude Measurement; Critical Psychology; Cross-Cultural Psychology; Cultural Psychology; Implicit Social Cognition; Indigenous Psychology; Levels of Analysis in Social Psychology; Social Constructionism; Social Psychological Theory, History of; Social Psychology.

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