

Extending the Cognitive Aspects of Survey Methodology (CASM): Mental State, Social Control, and Literacy in Online and Offline Surveys

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ABSTRACT

The rapid diffusion of online surveys has transformed data collection practices in social, business, and public policy research, often positioning self-administered online surveys as substitutes for interviewer-assisted offline surveys. However, operational efficiency does not automatically translate into higher data validity. From a data-centered perspective, data validity emerges from the interaction among the questionnaire, respondents, and enumerators. In offline surveys, enumerators act as cognitive and social mediators by ensuring comprehension, providing clarification, and maintaining social control—functions that are structurally absent in online surveys. Consequently, online surveys transfer the burden of comprehension and response quality control entirely to respondents, making measurement outcomes highly dependent on respondents' mental state and literacy dependence, while increasing the likelihood of satisficing under low-accountability conditions. Building on the Cognitive Aspects of Survey Methodology (CASM), this article argues that classical CASM implicitly assumes relatively homogeneous measurement conditions across survey modes. To address this limitation, the study proposes an enrichment of CASM by explicitly incorporating respondent mental state, literacy dependence, and social control at the comprehension stage as key structural distinctions between online and offline survey environments, with direct implications for data validity.

Keywords: Online surveys; Survey methodology; CASM; Data validity; Mode effects

INTRODUCTION

The rapid development of digital technology over the past two decades has transformed survey research by accelerating the adoption of online data collection across social, business, educational, and public policy research. Online surveys are increasingly preferred because they offer substantial operational advantages, including lower implementation costs, rapid data collection, efficient questionnaire distribution, and access to geographically dispersed and large respondent populations (Couper, 2008; Dillman et al., 2014). Consequently, online surveys have become the dominant mode of data collection in many research settings, increasingly replacing or complementing traditional interviewer-administered surveys. This transformation, however, extends beyond technological innovation. It fundamentally alters how respondents interact with survey instruments, how survey responses are generated, and how quality control mechanisms operate throughout the measurement process (Groves et al., 2009).

As online surveys have become the dominant mode of data collection, methodological priorities have also evolved. Contemporary survey methodology no longer evaluates survey performance primarily in terms of operational efficiency but increasingly emphasizes response quality, respondent engagement, measurement validity, and the overall integrity of self-administered survey data. This shift reflects growing recognition that sophisticated digital platforms do not inherently guarantee high-quality data (Couper et al., 2017; Lohr & Rao, 2025). Recent evidence suggests that data quality should be conceptualized as a process established throughout survey design and implementation rather than as a property evaluated only after data collection. Preventive

quality assurance, including respondent screening, survey design, and response validation, is increasingly viewed as more effective than relying solely on post hoc data cleaning (Schles & Deheck, 2026).

Survey responses emerge through complex interactions among questionnaire design, respondents' cognitive processing, behavioral engagement, and the conditions under which questionnaires are completed. Consequently, methodological attention has increasingly focused on preventing and identifying careless, inattentive, speeding, straightlining, and fraudulent responding while promoting questionnaire designs that facilitate accurate cognitive processing and meaningful respondent engagement (Ward & Meade, 2023; Margolis & Sances, 2024; Gottfried, 2024). Accordingly, survey quality is now understood as a multidimensional concept that extends beyond sampling and coverage error to encompass response processes, respondent behavior, and data validity (Stantcheva, 2023).

Despite these important methodological advances, contemporary approaches remain predominantly procedural. Existing frameworks primarily seek to improve response quality through attention checks, data cleaning, fraud detection, and other quality-control techniques. Although these procedures are indispensable for identifying problematic responses, they offer only limited theoretical explanation of why response quality systematically varies across different survey environments. In particular, comparatively little attention has been devoted to understanding how the broader structural conditions of self-administered surveys influence respondents' cognitive response processes and ultimately affect data validity. This unresolved theoretical issue becomes increasingly important as online surveys continue to replace interviewer-administered data collection in both scientific research and official statistics.

The importance of this issue is closely related to the growing concern over measurement equivalence across survey modes. Although identical questionnaires may be administered in online and offline settings, equivalent instruments do not necessarily produce equivalent measurements. Respondents completing self-administered online questionnaires operate under conditions that differ fundamentally from interviewer-assisted interviews with respect to cognitive support, opportunities for clarification, social accountability, and environmental distractions. Consequently, measurement equivalence depends not only on identical questionnaire content but also on whether respondents experience comparable cognitive and contextual conditions while constructing their responses. These structural differences suggest that survey mode influences not merely data collection procedures but also the cognitive environment within which survey responses are generated.

From a data-centered perspective, these differences have direct implications for data validity. Data validity arises from the interaction among three fundamental components of the survey process: the questionnaire, respondents, and enumerators. The questionnaire provides the measurement stimulus, respondents perform the cognitive work required to interpret and answer survey questions, and enumerators—when present—serve as cognitive and social mediators by facilitating comprehension, providing clarification, standardizing question delivery, and maintaining normative accountability throughout the interview process (Groves et al., 2009; Tourangeau et al., 2000). In self-administered online surveys, however, these mediating functions are structurally absent, transferring virtually the entire burden of comprehension, judgment, and response quality control to respondents themselves. Consequently, differences in data validity cannot be understood solely in terms of questionnaire characteristics but must also be explained by the structural conditions under which respondents generate survey answers.

These developments raise important questions regarding the continuing adequacy of the Cognitive Aspects of Survey Methodology (CASM), which has long served as the dominant theoretical framework for explaining survey response behavior. Classical CASM conceptualizes survey responding as a sequence of four cognitive stages, comprehension, retrieval, judgment, and response mapping, thereby providing a powerful explanation of cognitive sources of response error (Tourangeau et al., 2000). Nevertheless, the framework largely assumes that these cognitive processes operate under relatively homogeneous measurement conditions regardless of survey administration mode. Such an assumption becomes increasingly difficult to sustain in contemporary digital survey environments, where respondents experience substantial differences in cognitive support, literacy demands, social accountability, and motivational engagement during questionnaire completion.

Building upon these developments, this article argues that three structural conditions require explicit theoretical recognition within the CASM framework: respondents' mental state, social control, and literacy dependence. Rather than proposing additional cognitive stages, these constructs are conceptualized as structural antecedents that condition the execution of the existing CASM processes, particularly during comprehension, where respondents first interact with survey questions. Mental state reflects respondents' psychological readiness and willingness to invest cognitive effort; social control represents the normative accountability generated by interviewer presence or its absence; and literacy dependence captures respondents' ability to independently comprehend survey questions without external assistance. Together, these structural conditions provide a more comprehensive theoretical explanation of why identical survey instruments may produce systematically different response quality across online and offline survey modes.

Accordingly, the principal contribution of this article is to extend, not replace, the classical CASM framework by integrating structural conditions that have become increasingly important in digitally mediated survey environments. The proposed framework links contemporary concerns regarding online survey quality, respondent engagement, measurement equivalence, and data validity with the cognitive mechanisms underlying survey response behavior. Specifically, this study pursues four objectives: (1) to critically examine the assumptions of the classical CASM framework in self-administered online surveys; (2) to reconceptualize data validity from a data-centered perspective as the outcome of interactions among questionnaires, respondents, and enumerators; (3) to develop a conceptual extension of CASM by incorporating respondents' mental state, social control, and literacy dependence as structural determinants of cognitive response processes; and (4) to explain the theoretical mechanisms through which these structural conditions generate differences in response consistency and data validity across online and offline survey modes.

METHODOLOGY

Research Design

This study adopts a conceptual, theory-driven research design grounded in a critical and integrative review of the survey methodology literature. Rather than conducting an empirical analysis, the article aims to refine and extend existing theoretical frameworks by re-examining their underlying assumptions and contextual applicability in digitally mediated survey environments. This approach is particularly appropriate given the study's objective of enriching the Cognitive Aspects of Survey Methodology (CASM) to better account for structural differences between online and offline surveys.

Consistent with prior conceptual work in survey methodology and measurement theory, the study treats theory development as a systematic process of abstraction, comparison, and synthesis across established literatures, rather than as an inductive generalization from empirical data.

Literature Identification and Scope

The literature reviewed in this study was drawn from foundational and contemporary sources in survey methodology, cognitive psychology, and measurement theory. Priority was given to canonical works that have shaped the development of CASM and related perspectives on survey response behavior (e.g., Tourangeau et al., 2000; Groves et al., 2009), as well as influential studies examining online survey design, mode effects, and data validity in digital contexts (e.g., Couper, 2008; Dillman, 2014; Couper et al., 2017).

The scope of the review was intentionally selective rather than exhaustive. Instead of aiming for comprehensive coverage, the study focused on theoretically central contributions that explicitly address (a) cognitive processes underlying survey responding, (b) structural differences between interviewer-assisted and self-administered survey modes, and (c) sources of measurement error and data validity. This selective strategy aligns with the article's objective of theoretical enrichment rather than systematic evidence aggregation.

Analytical Strategy: Conceptual Decomposition and Synthesis

The analytical strategy consisted of three interrelated stages.

First, the classical CASM framework was decomposed into its core cognitive stages, comprehension, retrieval, judgment, and response mapping, to identify assumptions regarding respondent behavior, cognitive effort, and measurement conditions embedded within the model. Particular attention was paid to assumptions of homogeneity across survey modes.

Second, insights from the survey methodology literature on online surveys, satisficing behavior, social presence, and literacy-related comprehension challenges were mapped onto the CASM stages. This mapping exercise was used to identify structural conditions that systematically differentiate online and offline survey environments but remain under-theorized in classical CASM formulations.

Third, these insights were synthesized into an extended conceptual framework that introduces respondents' mental state, social control, and literacy dependence as structural conditions shaping the execution of CASM processes. Rather than proposing new cognitive stages, the extension conditions the intensity, depth, and reliability of existing CASM stages across survey modes.

Conceptual Validity and Boundary Conditions

Given the non-empirical nature of the study, conceptual validity was ensured through internal coherence, consistency with established theoretical constructs, and alignment with widely accepted empirical findings reported in the literature. Claims advanced in the article are bounded to explanatory and interpretive purposes and do not imply direct causal estimation or statistical generalization.

The proposed extension of CASM is intended as a conceptual framework to inform future empirical research rather than as a tested model. Accordingly, the article explicitly distinguishes between theoretical propositions and empirically testable hypotheses, thereby avoiding overextension beyond the evidentiary scope of the reviewed literature.

Implications for Future Empirical Research

Although the present study does not include original data analysis, its conceptual contributions are designed to be empirically tractable. The extended CASM framework provides a structured basis for future studies to operationalize respondent mental state, social control, and literacy dependence, and to examine their effects on response consistency and data validity across survey modes. In this sense, the methodology serves not only as a framework for theoretical synthesis but also as a guide for subsequent empirical investigation.

THEORETICAL FRAMEWORK

The following sections develop the theoretical core of the article by first revisiting the classical CASM framework and then extending it to account for structurally different survey modes.

Classical CSM

The Cognitive Aspects of Survey Methodology (CASM) framework was developed to explain the cognitive processes respondents engage in when answering survey questions. Grounded in cognitive psychology, CASM conceptualizes survey responses not as direct reflections of objective reality, but as the outcome of cognitive constructions formed through the interaction between question stimuli and respondents' mental processes (Tourangeau, 2000). This framework has become a foundational pillar of modern survey methodology because it provides a mechanistic account of how measurement error can arise at specific stages of the response process.

Classically, CASM models the survey response process as consisting of four core cognitive stages: comprehension, retrieval, judgment, and response mapping (Tourangeau et al., 2000). During the comprehension stage, respondents attempt to understand the meaning of the question, including the terminology used, the referenced context, and the measurement intent of the researcher. Errors at this stage—such as those arising from linguistic ambiguity or limited respondent understanding—may lead to miscomprehension, which subsequently contaminates all downstream stages of the response process. Comprehension therefore constitutes a critical entry point in determining overall response quality.

The subsequent stage, retrieval, involves accessing relevant information from respondents' memory. Retrieved information may include factual memories, episodic experiences, or general knowledge perceived as relevant to the question. The literature indicates that retrieval is highly sensitive to question characteristics, particularly for retrospective questions involving extended recall periods or infrequent events (Tourangeau et al., 2000). Failure to retrieve accurate or complete information at this stage constrains the quality of the raw material available for response formation.

Once relevant information has been retrieved, respondents enter the judgment stage, in which they evaluate, integrate, and synthesize information to form an internal assessment or attitude. At this stage, respondents may engage in cognitive simplification, rely on heuristics, or adjust judgments in response to social norms and situational context (Tourangeau et al., 2000; Schwarz & Oyserman, 2001). The judgment stage becomes particularly complex when respondents are required to reduce heterogeneous experiences into a single numerical value or categorical response.

The final stage, response mapping, involves translating the internal judgment into the response formats provided by the questionnaire. At this point, respondents must align their subjective evaluations with available response scales, categories, or options. Errors may arise when response formats do not correspond to how respondents frame their judgments or when available options fail to adequately represent perceived conditions (Tourangeau et al., 2000). Consequently, even when comprehension, retrieval, and judgment function relatively well, limitations at the response mapping stage can still generate measurement error.

One of CASM's key contributions lies in its emphasis that survey measurement error is not a singular phenomenon, but rather the cumulative result of potential disturbances occurring at each cognitive stage of responding. The framework also explains why question design, questionnaire format, and survey context play central roles in shaping data quality (Groves et al., 2009). Accordingly, CASM has been widely applied in the survey methodology literature to evaluate question design, diagnose sources of response error, and inform interventions aimed at reducing measurement error.

Despite its strengths, the application of CASM in many studies implicitly assumes that these cognitive stages operate under relatively uniform conditions across survey modes. Classical CASM does not explicitly distinguish how comprehension, retrieval, judgment, and response mapping may be shaped by differences in social context, control mechanisms, or the distribution of roles among actors involved in the survey process. In practice, this implicit assumption becomes increasingly problematic with the growing dominance of self-administered online surveys, in which respondents bear the full burden of comprehension and response quality control independently (Couper, 2008; Dillman et al., 2014).

Thus, while CASM provides a robust foundation for understanding the cognitive processes underlying survey responding, it requires further elaboration to adequately explain variations in data quality and data validity arising from structural differences between online and offline surveys. The following section develops an extension of CASM that incorporates respondents' mental state, social control, and literacy dependence at the comprehension stage, in response to the changing measurement context of the digital survey era.

Extending CASM

This section extends the Cognitive Aspects of Survey Methodology (CASM) by introducing three structural conditions that systematically differentiate online and offline surveys: respondents' mental state, social control,

and literacy dependence at the comprehension stage. These extensions do not replace the core cognitive stages of CASM; rather, they condition the intensity, depth, and reliability with which each CASM stage is executed across different survey contexts (Tourangeau, 2000; Groves et al., 2009).

Mental State

Respondents do not enter the cognitive response process in a psychologically neutral condition. Before the first survey question is read, respondents have already formed initial perceptions regarding the legitimacy of the survey, the credibility of the survey organization, the purpose of the study, and their willingness to participate. In interviewer-administered surveys, these perceptions are shaped through the initial interaction between enumerators and respondents, during which enumerators introduce themselves, explain the survey objectives, establish rapport, and obtain respondents' cooperation. In self-administered online surveys, comparable perceptions are formed through the survey interface, introductory statements, institutional identity, and respondents' own interpretation of the survey context. These early interactions contribute to the formation of respondents' mental state before the cognitive processes described by the classical CASM begin.

The classical Cognitive Aspects of Survey Methodology (CASM) explains how respondents generate survey answers through sequential cognitive processes of comprehension, retrieval, judgment, and response mapping (Tourangeau et al., 2000). However, the framework does not explicitly account for respondents' psychological state before these cognitive processes begin. In this study, mental state refers to respondents' overall psychological readiness to engage in the survey task. It reflects their motivation to participate, willingness to invest cognitive effort, attentional focus, perceived importance of the survey, and susceptibility to distraction during questionnaire completion. Rather than constituting an additional cognitive stage, mental state is conceptualized as a pre-cognitive structural condition that influences how respondents enter and subsequently execute the existing CASM processes (Krosnick, 1991).

Mental state influences survey responses by determining the amount of cognitive effort respondents allocate throughout the response process. Respondents who begin a survey with high motivation, sustained attention, and strong psychological readiness are more likely to engage in careful comprehension, retrieve relevant information more completely, evaluate response alternatives more deliberately, and select answers that accurately represent their judgments. Conversely, respondents experiencing low motivation, fatigue, competing demands, or environmental distractions are more likely to reduce cognitive effort and adopt simplified response strategies, commonly described as satisficing (Krosnick, 1991; Malhotra, 2008). Consequently, mental state does not replace the cognitive mechanisms proposed by CASM but conditions the quality with which each cognitive stage is executed.

Importantly, respondents' mental state is not determined solely by individual characteristics but is also shaped by the structural conditions under which surveys are administered. Interviewer-administered offline surveys typically provide stronger social presence, greater normative accountability, immediate clarification when respondents encounter difficulties, and a more structured survey environment. These conditions encourage respondents to enter the survey with higher psychological readiness and sustain cognitive engagement throughout the interview (Groves et al., 2009). In contrast, self-administered online surveys place respondents in relatively autonomous environments where interviewer support is absent, external distractions are more difficult to control, and respondents retain complete discretion over the amount of attention and effort devoted to questionnaire completion. As a result, identical respondents may exhibit substantially different mental states when completing the same questionnaire under different survey modes.

Conceptualizing mental state as a structural antecedent has both theoretical and practical implications. Theoretically, it extends the classical CASM framework by recognizing that cognitive response processes do not operate independently of respondents' initial psychological conditions. Instead, mental state conditions the execution of the existing CASM stages and provides a theoretical explanation for why identical questionnaires may produce systematically different response quality across online and offline survey modes. Practically, this perspective suggests that improving survey data quality requires more than procedural quality-control techniques such as attention checks or post-survey data cleaning. Survey designers should also adopt strategies that

strengthen respondents' psychological readiness and cognitive engagement, including clear survey introductions, appropriate questionnaire length, motivational prompts, respondent-friendly interfaces, and survey environments that minimize distraction. These measures help promote higher-quality cognitive processing and ultimately contribute to improved data validity.

Social Control

The second structural extension of the Cognitive Aspects of Survey Methodology (CASM) concerns social control, which refers to respondents' perception that their participation and response behavior are socially observable, normatively accountable, and expected to conform to the legitimate purpose of the survey. Classical CASM focuses primarily on the cognitive processes through which respondents generate answers but does not explicitly recognize the Social Controls under which these processes occur. In the present framework, social control is conceptualized as a structural condition arising from respondents' interaction with the survey context. Rather than representing an additional cognitive stage, it provides a social environment that shapes respondents' willingness to engage responsibly in the existing CASM processes.

Social control influences survey responses by regulating respondents' choice between optimizing and satisficing response strategies. When respondents perceive that their participation is socially accountable and that their responses are expected to reflect genuine effort, they are more likely to allocate sufficient cognitive resources to carefully comprehend survey questions, retrieve relevant information, evaluate response alternatives, and provide accurate answers. Conversely, when respondents perceive little or no social accountability, the incentive to invest cognitive effort diminishes, increasing the likelihood of satisficing behaviors such as superficial reading, hurried responding, straightlining, or other minimal-effort response strategies (Krosnick, 1991; Couper, 2008; Couper et al., 2017). Accordingly, social control does not modify the cognitive architecture proposed by CASM but conditions the degree of cognitive effort with which its existing stages are performed.

The level of social control differs fundamentally across survey modes because it is shaped by distinct patterns of interaction between respondents and the survey environment. In interviewer-administered offline surveys, social control is established through the presence of enumerators who introduce themselves, explain the survey objectives, verify respondents' understanding, and maintain interpersonal interaction throughout the interview. These initial and ongoing interactions foster perceived accountability, reinforce respondents' sense of responsibility, and encourage sustained cognitive engagement during questionnaire completion (Groves et al., 2009). In contrast, self-administered online surveys are typically completed in relatively anonymous and unsupervised environments where respondents independently determine the amount of attention and effort devoted to the survey. The absence of direct interpersonal interaction reduces perceived accountability and creates conditions under which satisficing may become a rational response to the survey context. Consequently, differences in social control arise not merely because enumerators are absent, but because respondents experience fundamentally different levels of perceived social accountability across survey modes.

Conceptualizing social control as a structural antecedent has important theoretical and practical implications. Theoretically, it extends the classical CASM framework by recognizing that cognitive response processes are embedded within social environments that influence respondents' willingness to engage in effortful and responsible survey participation. This perspective provides a theoretical explanation for why identical questionnaires may generate systematically different response quality under different modes of survey administration. Practically, it suggests that improving survey quality requires strengthening respondents' perceived accountability in addition to implementing procedural quality-control techniques. In interviewer-administered surveys, this can be achieved through professional enumerator training, effective respondent engagement, and clear communication of the survey's purpose and legitimacy. In self-administered online surveys, comparable social accountability may be encouraged through institutional credibility, transparent introductory statements, personalized invitations, and survey designs that reinforce respondents' sense of meaningful participation. These strategies help create survey environments that promote greater cognitive engagement and ultimately improve data validity.

Literacy Dependence

The third structural extension of the Cognitive Aspects of Survey Methodology (CASM) concerns literacy dependence, which refers to the extent to which successful execution of the survey response process relies on respondents' ability to independently comprehend, interpret, and apply questionnaire information without external cognitive assistance. Classical CASM assumes that respondents are capable of understanding survey questions and initiating the cognitive response process once questions are presented. However, the framework does not explicitly recognize that respondents differ in the extent to which they depend on their own literacy skills to successfully execute these cognitive tasks. In the present framework, literacy dependence is conceptualized as a structural condition that determines the degree to which respondents must rely on independent comprehension before and throughout the existing CASM processes.

Literacy dependence influences survey responses by affecting the quality of cognitive processing, particularly during the comprehension stage, where respondents first interpret survey questions and establish the meaning required for subsequent retrieval, judgment, and response mapping. When respondents possess sufficient literacy and are able to independently interpret questionnaire content, the cognitive response process is more likely to proceed accurately and consistently. Conversely, when respondents experience difficulty understanding question wording, response options, instructions, or survey terminology without external assistance, misunderstanding at the comprehension stage is likely to propagate throughout the remaining CASM processes, increasing the risk of response error and reducing data validity. Thus, literacy dependence does not introduce a new cognitive stage but conditions the quality with which the existing cognitive processes are initiated and executed.

The degree of literacy dependence differs substantially across survey modes because the availability of cognitive assistance varies between interviewer-administered and self-administered surveys. In interviewer-administered offline surveys, enumerators provide immediate clarification when respondents encounter unfamiliar concepts, ambiguous wording, or difficulties interpreting questionnaire instructions. Consequently, respondents rely less exclusively on their own literacy because external cognitive support is available throughout the interview process (Groves et al., 2009). In contrast, respondents completing self-administered online surveys must independently interpret all questionnaire content without immediate clarification. Under these conditions, successful survey completion depends much more heavily on respondents' individual literacy and comprehension skills. As a result, identical questionnaires may impose substantially different cognitive demands across survey modes even when their wording remains unchanged.

Conceptualizing literacy dependence as a structural antecedent has important theoretical and practical implications. Theoretically, it extends the classical CASM framework by recognizing that the quality of cognitive response processes depends not only on respondents' motivation or social accountability but also on their ability to independently construct accurate interpretations of survey questions. This perspective provides an additional explanation for why equivalent questionnaires may produce different levels of response consistency and data validity across online and offline surveys. Practically, it highlights the importance of designing questionnaires that minimize unnecessary literacy demands through clear wording, intuitive instructions, familiar terminology, appropriate visual layout, and respondent-centered questionnaire design. For self-administered online surveys in particular, reducing literacy dependence through improved questionnaire design becomes an essential strategy for promoting accurate cognitive processing and improving overall data quality.

Integrating Structural Conditions into the CASM Process

Survey research often implicitly assumes that respondents who agree to participate will provide meaningful answers once a questionnaire is presented. In reality, respondents are autonomous actors who may accept, postpone, or refuse participation according to their circumstances, perceived risks, trust in the requesting institution, and assessment of the study's relevance or legitimacy. Even when participation is accepted, consent does not necessarily indicate that respondents are psychologically prepared, socially committed, or sufficiently able to perform the cognitive work required to produce high-quality responses. Voluntary participation therefore

represents only the entry threshold of the survey process rather than a guarantee of meaningful cognitive engagement.

The proposed extension of the Cognitive Aspects of Survey Methodology (CASM) addresses this limitation by integrating three complementary structural conditions: mental state, social control, and literacy dependence. Mental state reflects respondents' psychological readiness and willingness to allocate attention and cognitive effort; social control reflects the extent to which respondents perceive their participation and response behavior as socially meaningful and normatively accountable; and literacy dependence reflects the degree to which successful survey completion relies on respondents' ability to independently comprehend and process questionnaire information. Rather than constituting additional cognitive stages, these conditions form the enabling—or constraining—environment within which the classical CASM processes are executed (Krosnick, 1991; Tourangeau et al., 2000).

The three structural conditions operate complementarily throughout comprehension, retrieval, judgment, and response mapping. Mental state influences the amount of attention and effort respondents are prepared to invest. Social control shapes whether they approach the survey as a meaningful and accountable interaction or as a task that can be completed with minimal effort. Literacy dependence determines whether respondents can accurately interpret questions, instructions, and response categories without immediate external assistance. When motivation, ability, or engagement is insufficient, respondents may reduce cognitive effort and adopt satisficing strategies, including superficial reading, speeding, repetitive response patterns, or incomplete processing of item content (Krosnick, 1991; Arthur et al., 2021; Ward & Meade, 2023). Attentiveness should therefore be understood not merely as a stable respondent characteristic but as survey behavior shaped by questionnaire design, administration conditions, and task engagement (Margolis & Sances, 2024).

Deficiency in one structural condition may impair response quality even when the others are favorable. A motivated and accountable respondent may still provide inaccurate answers if questionnaire demands exceed their capacity for independent comprehension. Conversely, a respondent with sufficient literacy may respond superficially when motivation and perceived accountability are weak. Strong social control may encourage careful participation, but excessive social pressure may also produce acquiescence, over-compliance, concealment, or socially desirable responding, especially when questions concern sensitive attitudes or behaviors (Tourangeau & Yan, 2007; Kreuter et al., 2008). The three conditions should therefore not be treated as independently additive guarantees of data quality; rather, their configuration determines whether CASM processes are performed carefully, superficially, defensively, or strategically.

The configuration of these conditions differs systematically across survey modes. In interviewer-administered surveys, initial interaction with an enumerator may establish trust, clarify the survey's purpose and legitimacy, strengthen respondents' willingness to cooperate, and create normative accountability. Enumerators may also reduce literacy dependence by clarifying standardized instructions and detecting indications of misunderstanding (Groves et al., 2009). However, interviewer presence does not automatically ensure superior responses because weak rapport, perceived coercion, insufficient interviewer competence, or excessive social pressure may instead generate apprehension or socially desirable answers (Kreuter et al., 2008). Self-administered online surveys provide greater autonomy, privacy, and flexibility but remove immediate interpersonal support, weaken direct accountability, expose respondents to uncontrolled distractions, and transfer the burden of comprehension largely to respondents themselves. These conditions may increase insufficient-effort and careless responding when respondents experience fatigue, multitask, lose interest, or perceive few consequences for superficial completion (Galesic & Bosnjak, 2009; Ward & Meade, 2023; Welz & Alfons, 2023).

These structural differences influence data quality through their effects on cognitive execution and response behavior. Favorable conditions encourage optimizing strategies characterized by careful comprehension, relevant information retrieval, deliberate judgment, and accurate response mapping. Unfavorable conditions increase the likelihood of satisficing, inconsistent responses, straightlining, speeding, or other forms of insufficient-effort responding. Such behaviors may distort correlations, dimensional structures, parameter estimates, and other psychometric properties, thereby affecting both the consistency and interpretability of

survey measurements (Huang et al., 2015; Kam, 2019; Ward & Meade, 2023). Respondent behavior should therefore be understood as the observable manifestation of the interaction between structural conditions and the cognitive processes described by CASM.

The resulting consequences concern both validity and reliability. When respondents are psychologically prepared, perceive meaningful responsibility for their participation, and can accurately understand the questionnaire, their recorded responses are more likely to represent the intended knowledge, experiences, attitudes, or conditions, thereby strengthening data validity. These conditions may also improve reliability by reducing random inconsistency arising from distraction, unstable strategies, misunderstanding, and superficial processing. Reliability, however, does not by itself establish validity, because respondents may answer consistently while systematically misunderstanding questions, concealing information, complying with perceived expectations, or repeatedly providing socially desirable responses. Accordingly, the integrated framework shifts survey quality assurance from a predominantly reactive approach—based on attention checks, fraud detection, response screening, and post-survey cleaning—toward proactive quality design that establishes respondents’ readiness, accountability, and comprehension before and during survey participation (Curran, 2016; Dillman et al., 2014; Gottfried, 2024; Ward & Meade, 2023). From this perspective, valid and reliable data do not begin with the first recorded answer; they begin with the structural conditions that enable respondents to execute CASM effectively.

Figure 1 illustrates how survey mode (online vs. offline) shapes distinct structural conditions before and during the cognitive response process. In offline surveys, enumerator presence creates social control and cognitive buffering that moderate CASM processes. In online surveys, the absence of enumerators shifts comprehension and quality control burdens entirely to respondents, increasing dependence on mental state and literacy while elevating the probability of satisficing.

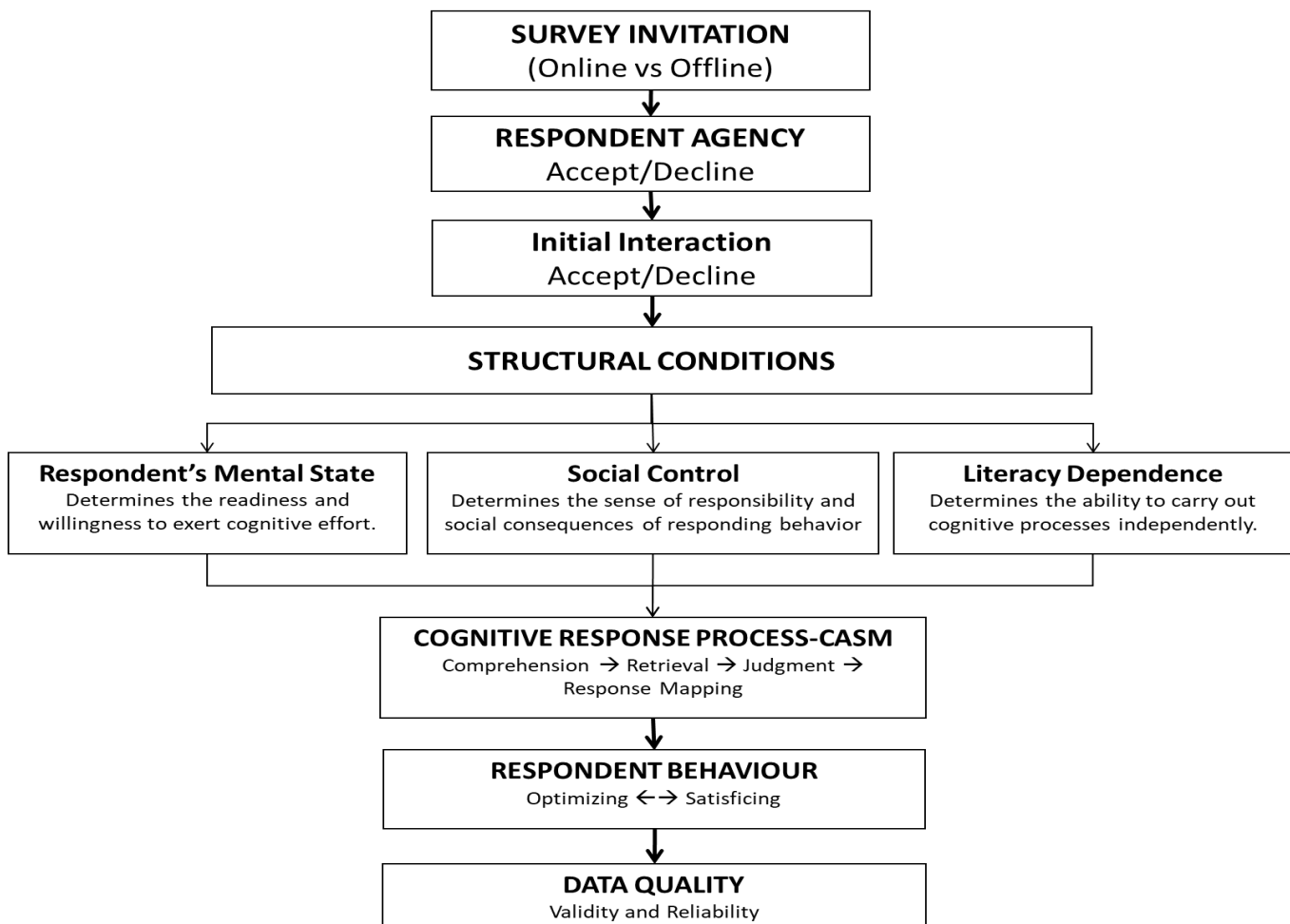


Figure 1. A Structural Extension of the Cognitive Aspects of Survey Methodology (CASM)

Theoretical Propositions

Based on an enriched CASM framework that incorporates respondents' mental state, social control, and literacy dependence at the comprehension stage, this article proposes five theoretical propositions, namely;

P1. Mental State and the Intensity of CASM Processes

Differences in respondents' mental state between online and offline surveys condition the cognitive effort devoted to each CASM stage and depth with which each CASM stage (comprehension, retrieval, judgment, and response mapping) is executed, resulting in systematic differences in response quality and consistency.

This proposition emphasizes that CASM processes do not operate under psychologically neutral conditions. Rather, mental state functions as an initial condition that determines whether respondents allocate sufficient cognitive effort or adopt minimal-effort processing strategies.

P2. Social Control as a Moderating Mechanism of Satisficing

Variation in perceived social accountability across survey modes influences respondents' propensity to adopt optimizing or satisficing response strategies. Lower levels of perceived social accountability, which are generally more characteristic of self-administered online surveys than interviewer-administered surveys, increase the likelihood of satisficing behavior and consequently weaken response stability and consistency, particularly for cognitively demanding questions.

P3. Literacy Dependence and Vulnerability of the Comprehension Stage

Reliance on respondents' literacy in online surveys heightens the risk of miscomprehension occurring at the comprehension stage propagates through subsequent CASM stages, which is relatively difficult to correct and exerts cumulative effects on subsequent CASM stages.

This proposition asserts that comprehension errors in online surveys are not merely random variations, but constitute a structural source of measurement error.

P4. Differential Effects by Question Type

The effects of mental state, social control, and literacy dependence on response consistency across survey modes are stronger for cognitively demanding questions than for affective questions, because cognitive questions require greater comprehension, retrieval, and judgment effort

This proposition explains why affective questions tend to exhibit higher cross-mode consistency, whereas cognitive questions are more susceptible to variation arising from differences in measurement context.

P5. Structural Conditions and Data Validity

Data validity is jointly determined by the interaction between respondents' structural conditions and the cognitive response processes described by CASM, rather than by questionnaire characteristics alone.

This proposition synthesizes the previous propositions by arguing that valid survey data emerge when respondents possess adequate psychological readiness, perceive meaningful social accountability, and are capable of independently comprehending survey questions. Deficiency in any of these structural conditions may impair cognitive processing and reduce the correspondence between recorded responses and the reality intended to be measured.

Methodological And Survey Design Implications

The proposed enrichment of CASM carries important methodological implications, particularly for the design of online surveys and the interpretation of data quality.

Implications for Questionnaire Design

a. Reducing comprehension burden

Questions in online surveys should be designed using simple linguistic structures, short sentences, and non-technical terminology to minimize the risk of miscomprehension.

b. Separating cognitive and affective functions

Cognitive and affective questions should be treated as distinct categories in both questionnaire design and data quality evaluation.

c. Limiting complex retrospective questions

Questions requiring long-term memory retrieval should be used selectively or supplemented with bounding cues to support accurate recall.

Implications for Control Mechanisms in Online Surveys

a. Partial substitution of enumerator functions

Online surveys should incorporate soft social control cues (e.g., personalized instructions, accountability messages, or progress indicators) to mitigate the loss of social control.

b. Provision of clarification mechanisms

Support features such as help texts, tooltips, or concrete examples can serve as limited substitutes for enumerator assistance at the comprehension stage.

Implications for Evaluating Data Quality and Validity

a. Consistency as a process indicator

Differences in response consistency across survey modes should be interpreted as reflections of differences in CASM processes rather than as mere random noise.

b. Constraining inferential claims

Data derived from online surveys should be evaluated with explicit consideration of structural limitations in comprehension and social control, particularly when drawing inferences from cognitively demanding questions.

DISCUSSION

This article argues that the differences between online and offline surveys extend far beyond operational considerations such as cost, speed, or accessibility. The transition from interviewer-administered to self-administered data collection fundamentally reshapes the architecture of survey measurement by redistributing cognitive responsibilities between respondents and enumerators. As illustrated in Figure 1, respondents in online surveys no longer function solely as providers of information; they simultaneously assume the roles of reader, interpreter, decision maker, and quality controller throughout the response process. Consequently, data quality

should be understood not only as a function of questionnaire design but also as the product of the structural conditions under which respondents construct their answers.

From this perspective, the cognitive processes described by the classical CASM framework do not operate under psychologically or socially neutral conditions. Respondents enter the survey with varying levels of psychological readiness, perceive different degrees of social accountability, and possess different capacities to independently interpret questionnaire content. These structural conditions influence the cognitive effort devoted to comprehension, retrieval, judgment, and response mapping, thereby determining whether respondents engage in optimizing or satisficing response strategies. The proposed framework therefore extends CASM by recognizing that cognitive response processes are conditioned by the survey environment in which they occur rather than by questionnaire characteristics alone.

A central implication of this framework is that survey mode influences data quality because it creates different structural conditions for cognitive processing. Interviewer-administered surveys establish opportunities for trust building, normative accountability, and immediate clarification, all of which support respondents' engagement with the survey task and reduce the cognitive burden associated with independent interpretation. In contrast, self-administered online surveys provide greater autonomy and flexibility but simultaneously weaken direct accountability and transfer responsibility for comprehension almost entirely to respondents themselves. These structural differences help explain why respondents may produce systematically different response quality even when completing identical questionnaires.

The proposed framework further explains why mode effects vary according to question characteristics. Questions requiring extensive comprehension, information retrieval, comparison, or judgment are particularly sensitive to variations in respondents' mental state, perceived social accountability, and literacy dependence. In contrast, affective questions often rely more directly on respondents' immediate evaluations or feelings and therefore require less complex cognitive processing. Consequently, differences in response consistency between online and offline surveys are expected to become increasingly pronounced as the cognitive demands imposed by survey questions increase.

An important contribution of this framework is its reinterpretation of respondent behavior. Rather than viewing careless responding or satisficing simply as undesirable respondent characteristics, the present study conceptualizes these behaviors as adaptive responses to structural conditions that reduce motivation, accountability, or comprehension. Respondents who provide superficial or inconsistent answers are not necessarily unwilling to cooperate; rather, they may be responding to survey environments that fail to support adequate cognitive engagement. This perspective shifts attention from blaming respondents toward understanding how survey design and administration influence the response process itself.

The proposed framework also provides a broader understanding of data quality. Data validity and reliability emerge through the interaction between respondents' structural conditions and the cognitive response processes described by CASM. High-quality data therefore cannot be attributed solely to well-designed questionnaires or sophisticated survey platforms. Instead, they depend on creating survey conditions that encourage respondents to invest cognitive effort, perceive meaningful responsibility for their participation, and accurately understand the information presented to them. From this perspective, reliability reflects the consistency with which cognitive processes are executed, whereas validity reflects the extent to which recorded responses faithfully represent the phenomena the survey intends to measure.

The principal contribution of this article is therefore not merely the addition of three constructs to the classical CASM framework. Rather, it proposes a conceptual shift in survey methodology by recognizing that valid and reliable survey data begin before the first survey question is answered. They begin with the structural conditions that enable respondents to engage meaningfully in the cognitive response process. Future empirical research may test the propositions developed in this study across different survey modes, populations, and questionnaire designs, thereby evaluating the explanatory value of the proposed framework for understanding response quality and data validity in contemporary survey research.

CONCLUSION

This article proposes an extended Cognitive Aspects of Survey Methodology (CASM) framework to explain how structural conditions shape cognitive response processes and ultimately influence survey data quality in contemporary online and offline survey environments. By incorporating mental state, social control, and literacy dependence as structural conditions surrounding the classical CASM processes, the framework demonstrates that respondents do not enter the cognitive response process under psychologically, socially, or cognitively neutral conditions. Instead, these structural conditions influence the quality with which comprehension, retrieval, judgment, and response mapping are executed, thereby contributing to systematic differences in response consistency, data validity, and measurement quality across survey modes.

The principal theoretical contribution of this study lies in reframing survey data quality as the outcome of an interaction between respondents' structural conditions and the cognitive response processes through which survey answers are constructed. Rather than viewing questionnaire characteristics as the primary determinant of data quality, the proposed framework argues that valid and reliable survey data emerge only when respondents possess adequate psychological readiness, perceive meaningful social accountability, and are capable of independently comprehending survey questions. In doing so, the proposed framework extends the explanatory scope of the classical CASM without altering its cognitive architecture, providing a more comprehensive theoretical foundation for understanding mode effects and data validity in self-administered surveys.

More fundamentally, this study proposes a conceptual shift in survey methodology. Respondents should no longer be viewed as passive providers of information who automatically generate valid data once a questionnaire is presented. Instead, they should be understood as active agents whose psychological readiness, perceived accountability, and cognitive capability jointly determine how cognitive response processes unfold and whether those processes produce valid and reliable survey data. From this perspective, differences between online and offline surveys arise not merely from differences in survey media but from differences in the structural conditions under which respondents engage with the survey task.

This perspective carries important methodological implications for survey design and implementation. Improving survey quality should extend beyond developing better questionnaires or identifying problematic responses after data collection. Instead, researchers should deliberately design survey environments that promote respondents' cognitive engagement before and throughout questionnaire completion. Such efforts include establishing trust and legitimacy during recruitment, strengthening respondents' sense of accountability, reducing unnecessary cognitive burden, providing clear and accessible questionnaire designs, and supporting respondents' independent comprehension. Consequently, survey quality assurance becomes a proactive process of designing structural conditions that facilitate high-quality cognitive responding rather than solely a reactive process of detecting and correcting low-quality data.

Future research should empirically evaluate the propositions advanced in this study across different survey modes, populations, questionnaire formats, and cultural settings. Experimental and mixed-mode studies are particularly well suited to examining how mental state, social control, and literacy dependence interact to influence cognitive response processes and data quality. Such research would not only provide empirical validation for the proposed framework but also contribute to the development of survey methodologies that are better aligned with the realities of measurement in the digital era.

Ultimately, the proposed framework argues that high-quality survey data begin not when respondents answer the first survey question, but when survey conditions enable them to engage meaningfully in the cognitive response process. Recognizing respondents' structural conditions as an integral component of survey methodology represents a necessary step toward developing more valid, reliable, and theoretically grounded approaches to data collection in the digital age.

Research Contributions

This article contributes to survey methodology by proposing a broader theoretical explanation of how survey data quality is produced in contemporary online and offline survey environments. Rather than treating mode effects as merely technical differences in data collection, the proposed framework explains how differences in survey administration reshape the structural conditions under which respondents perform the cognitive processes described by the Cognitive Aspects of Survey Methodology (CASM). The theoretical contributions of this study can be summarized in four interrelated aspects.

First, this article extends the classical CASM framework by introducing respondents' mental state as a structural condition preceding the cognitive response process. While CASM conceptualizes survey responding as a sequence of comprehension, retrieval, judgment, and response mapping (Tourangeau et al., 2000), it largely assumes that respondents enter these processes under relatively similar cognitive and motivational conditions. The proposed framework relaxes this assumption by arguing that respondents' psychological readiness, motivation, attentional capacity, and situational engagement determine the amount of cognitive effort devoted to every subsequent CASM stage. Drawing upon research on survey motivation, bounded rationality, and response effort (Simon, 1957; Couper, 2008; Groves et al., 2009), this study reconceptualizes mental state as a structural prerequisite for cognitive survey responding rather than merely an individual difference influencing response quality.

Second, the proposed framework reconceptualizes social control as perceived social accountability that conditions respondents' response strategies throughout the survey process. Rather than viewing interviewer presence simply as a procedural distinction between online and offline surveys, this study argues that different survey modes create different levels of perceived accountability that influence respondents' willingness to engage responsibly in cognitive processing. Under lower levels of perceived social accountability, respondents are more likely to adopt satisficing strategies, whereas stronger accountability encourages greater cognitive engagement and optimizing behavior. Building upon classical satisficing theory (Krosnick, 1991) and subsequent work on interviewer effects and digitally mediated surveys (Couper et al., 2017; Kreuter et al., 2008), the article reframes mode effects as structural consequences of differences in social accountability rather than as artifacts of questionnaire administration alone.

Third, this study explicitly positions literacy dependence as a structural determinant of comprehension quality in self-administered surveys. Although comprehension has long been recognized as the foundation of accurate survey responding, previous research has generally treated respondents' literacy as an implicit background characteristic rather than an explicit theoretical construct. The proposed framework argues that, particularly in online surveys, respondents must independently construct the meaning of questionnaire items without immediate cognitive assistance. Misinterpretation at the comprehension stage therefore propagates through retrieval, judgment, and response mapping, creating cumulative measurement error that is difficult to detect after data collection. By conceptualizing literacy dependence as a structural condition rather than an individual attribute alone, this study explains why identical questionnaires may produce systematically different levels of data validity across survey modes (Tourangeau et al., 2000; Willis, 2004).

Finally, the principal contribution of this article lies in integrating mental state, social control, and literacy dependence into a unified structural framework surrounding the classical CASM model. Rather than treating these constructs as separate influences on survey quality, the proposed framework conceptualizes them as complementary structural conditions that jointly shape respondents' readiness to engage in cognitive processing. This integration provides a coherent theoretical explanation for why identical questionnaires administered under different survey modes may generate systematically different levels of response consistency, measurement quality, and data validity. More broadly, the proposed framework shifts the focus of survey methodology from explaining data quality primarily through questionnaire characteristics toward understanding data quality as the outcome of an interaction between respondents' structural conditions and the cognitive processes through which survey responses are constructed. In doing so, the article extends the explanatory scope of CASM from

describing how respondents construct answers to explaining under what structural conditions those cognitive processes can generate valid and reliable survey data.

Collectively, these contributions reposition respondents from passive sources of information to active agents whose structural conditions fundamentally shape the production of valid and reliable survey data.

Limitations Of The Conceptual Approach

As a conceptual study, the proposed framework is intended to advance theoretical understanding rather than provide empirical verification. Accordingly, several limitations should be acknowledged. First, although the framework is grounded in established theories of survey methodology and cognitive psychology, the relationships among mental state, social control, literacy dependence, and cognitive response processes remain conceptually derived and require empirical validation across different survey contexts. The propositions advanced in this article should therefore be regarded as hypotheses for future investigation rather than empirically confirmed causal relationships.

Second, the proposed framework conceptualizes mental state, social control, and literacy dependence as complementary structural conditions but does not explicitly specify their dynamic interrelationships. Future research may examine whether these conditions interact, reinforce, or compensate for one another under different survey environments, thereby extending the explanatory scope of the proposed framework.

Third, the article focuses primarily on conceptual development and therefore does not propose operational measures for the three structural conditions. Developing reliable and valid instruments to assess respondents' mental state, perceived social accountability, and literacy dependence represents an important next step for translating the framework into empirical survey research.

Finally, the framework is developed primarily to explain differences between interviewer-administered and self-administered surveys. Its applicability to more complex survey environments—including mixed-mode surveys, adaptive survey designs, mobile-first questionnaires, and culturally diverse populations—remains an open empirical question. Future studies should therefore evaluate the generalizability of the proposed framework across different survey modes, populations, and measurement contexts.

Taken together, these limitations do not diminish the theoretical contribution of the proposed framework. Rather, they identify important directions through which the framework may be refined, operationalized, and empirically evaluated, contributing to the continued development of survey methodology in increasingly digital and heterogeneous research environments.

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