
Sounds of Silence: The Structure of Response Latencies in Cognitive Assessments

Nora Cate Schaeffer

Department of Sociology
UW Survey Center
University of Wisconsin Madison

Douglas W. Maynard

Department of Sociology
University of Wisconsin Madison

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What is response latency?

- In survey research, response latency usually refers to the time between when the interviewer finishes reading the question and when the respondent begins the answer
- Theory suggests that duration of response latency should be associated with characteristics of answer, and there is empirical evidence to suggest it sometimes is
- With the ease of digitally recording interviews and advances in analyzing interaction, it may be possible to measure response latencies more routinely or different ways
 - Concept is clear, but measuring response latency in surveys encounters practical problems
 - Some of these problems draw attention to other features of response latency that we might try to measure

Overview

- Components of response latency
- Current analysis
- Examples from letter fluency cognitive assessment task in Wisconsin Longitudinal Study
 - General features of answers
 - Content and structure of response latency
- Comments



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Components of response latency

- Response latency has several components
 - Length or duration
 - Content
 - Structure



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Duration of response latency as a candidate indicator

- Effort devoted to cognitive processing
- Difficulty of cognitive processing required by the question
- Accessibility or strength of attitudes
- Measurement error
- Problems in question design or fit between respondent's situation and question



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Length of response latency: Illustrative results for surveys

- Questions about “facts” (classification of statuses and events and frequency of events and behaviors)
 - Response latency is shortest for correct answers, longest for “nonsubstantive” answer (Draisma and Dijkstra 2004, p. 141)
 - Response latencies shorter for correct “yes” answers than for other combinations (Draisma & Dijkstra 2004, p. 141)
 - Pause greater than 2 seconds associated with less-accurate reports about joint legal custody (Schaeffer and Dykema 2004, p. 500)
 - Short and long response latencies associated with less accurate answers (Ehlen, Schober, and Conrad 2005)



Illustrative results (continued)

- Subjective questions about attitudes and judgments
 - People who answer attitude questions quickly may be less likely to change position in response to a counterargument (Bassili 1996, p. 334)



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Challenges in measuring length of response latency (in part from Draisma and Dijkstra 2004)

- Measures omit reading of survey question, but processing begins with reading of the question and speed with which question is read may affect response latency
- Answer slot may have complex content, and it is not clear whether latency “ends” when respondent begins to answer or when the respondent finishes answer
- Respondent may give several answers, not all of them codable, and it is not clear whether latency does or should “end” with first answer, codable answer, or final answer
- There may be an interruption or interaction before the respondent provides an answer



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Content of response latency (see Prince et al. 1982, Bortfeld et al. 2001, Draisma and Dijkstra 2004)

- Content of latency depends on what is the “answer”
- Things you can observe in the same turn as a codable answer include
 - Silence
 - “Disfluencies”
 - Particles or fillers – umm, uhh, er, hmm
 - Restarts, repairs
 - Repeats of parts of the question
 - Repeats of candidate answers
 - Editing expressions (“I mean”) (rare?)
 - Rumination, muttering, comments on thinking process



Content of response latency (continued)

- Mitigators (uncertainty markers or hedges)
 - Doubt or shield (“I think”)
 - Approximation (“about”)
 - Distancing (“put x”)
 - Note: These may also appear after codable answer
- Instead of – or sometimes in the same turn as – a codable answer, R may also give
 - Report
 - Considerations
 - Quantification
 - Conjecture
 - Request for clarification



Disfluencies in answers to survey questions: Illustrative results

- For complicated mappings (Schober and Bloom 2004)
 - Average length of pause longer (in standardized interviews)
 - Percent of questions with at least one filler is greater (in standardized interviews)
 - Repairs more likely
 - Hedging more common (in standardized interviews)
 - Reporting more common
 - Multiple disfluencies more common (e.g., pause + filler, pause + repair) (though sometimes only for standardized interviews)



Data

- Interaction and cognition in surveys of older adults (Schaeffer and Maynard)
- Wisconsin Longitudinal Study (WLS)
- Digital recordings of interviews with members of panel of 10,000 members of Wisconsin high school class of 1957
- Telephone interviews in 2004 and 2005
- Randomly selected one case from each interviewer in one replicate
- Randomly subsampled 50 cases
- Conversation analysis for developing coding system for health and metacognition questions and cognitive assessments (letter fluency and digit ordering)



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Current analysis

- WLS included several cognitive tasks
- Different cognitive assessments are designed to recruit different cognitive abilities
- Initial observations suggested that structure of response latency might vary for different cognitive tasks in WLS
- If structure of latency varies by cognitive task, then structure of latency might be a useful indicator of which cognitive abilities respondents are using
- This analysis would require measures of structure of response latency and method for comparing this structure across different cognitive tasks

Letter fluency cognitive task

Okay, now this next task is a little different; it has to do with memory and thinking. I am going to say a letter of the alphabet, and I want you to say as quickly as you can all of the words you can think of that begin with that letter. You may say any word at all except proper names of people or places, like “Michael” or “Madison” if the letter I said was M. Also, do not use the same words again with a different ending, such as “eat” and “eating” if the letter I said was E. Often people think of a few words and then draw a blank; if this happens, just keep on trying. You will have only one minute to do this, so you shouldn’t use your time to make other comments to me, you should keep trying to think of words until the minute is up. Is this clear?

Now try to think of words that begin with the letter L as in Linda. Start now.



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General features observed in answers to letter fluency task

- Words are produced in bursts or as singles
 - Usually an initial burst
 - Bursts often three, sometimes two or four
 - Internal rate of word production in these bursts may decrease over the task
- Associative processes
 - Content
 - Phonetic
 - Task evaluation or commentary (e.g., “lackluster”)
 - Strategic
- Some words are commonly mentioned (e.g., “love”), other words are not (e.g., “ludicrous”)



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Structure of response latencies in letter fluency

- Silence
 - Length
 - Placement with respect to particles and words
- Particles
 - Content
 - Placement with respect to silences and words
- Muttering
 - Content
 - Placement with respect to silences and particles



Collections

- Reviewed letter fluency task for the 50 cases
- Identified several rough patterns of particles and silences
- Principal collections
 - Particles
 - Few particles during latencies
 - More particles during latencies
 - Appears to be variation with respect to the rhythm with which particles are produced
 - Presence or absence of muttering



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Transcriptions

- Phonetic
- : elongation
- Degree marks – quiet
- Arrows – intonation
- .hh - breaths

Case 12: Collection of latencies with no particles



FI: [.h]h (0.1) O:ka::y now try tah
thinkuv wo:rds that begin with
>tha letter e:ff as in Fra:nk.<
Start ↑no:w. (1.0)

FR: Fa:rm (1.8)
FR: fa:n (0.4)
FR: frie:nd (0.8)
FI: .hh (0.9)
FR: fa:rmer (2.1)
FR: fa:mous? (8.0)
FR: fu::n(d) (0.7)
FR: fa:bulous. (0.7)

FR: fu:rious (3.4)
FR: fre:nch°u~h° (13.6)
FR: fe:nce(s) (5.2)
FR: foo:tba:ll? (10.4)
FR: fa:mouss (6.5)
FR: fa::wnn (3.5)
FR: fi:nge:r? (2.0)
FR: fi:ght.? (4.8)

FI: .t .hh O↑ka::y. (0.1) Tha
minute is up. .hh (0.1) You: did
rea:lly we:ll.



Case 12: Comments

- Initial burst of three words (farm, fan, friend) followed by other bursts (farmer, famous) (fund, fabulous, furious) (fawn, finger, fight)
- Both respondent and interviewer tolerate long silences



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Case 2: Collection of latencies with few particles, muttering



MI: No:w- try tah(h) think of a:l
tha words you c'n th(h)ink of
that begin with tha letter e:l as
in Li:nda. (0.4) Start no:w. =

MR: =Oka:y

MR: la:dy love .hh la:ck(h) (1.1)

MR: u:h loa:ding (0.7)

MR: lou:d (0.9)

MR: lu:dicrous (1.0)

MR: la:me (3.8)

MR: la:ckluster hh (1.6)

MR: (loa:d) (3.1)

MR: lea:k hh (2.7)

MR: la:rk h (3.5)

MR: (lee:ward) (3.0)

MR: .t (lee:high) h (0.4)

MR: .t That's a na:me that
°shouldn' be in there° .hh
u(h):m (3.4)

MR: lou:sy hh (1.4)

MR: loa:d[↑]ed (5.1)

MR: lo:w. (2.1)

MR: la:d. (5.9)

MR: u~::~:muh hhh (2.3)

MR: li:ne hh (1.7)

MI: .tch oka:y tha minute is u[↑]:p.



Case 2: Comments

- General features
 - Initial burst of three words
 - Subsequent groups of three words (e.g., loading, loud, ludicrous)
 - Task evaluation (lackluster, lousy)?
 - Length of silence between words roughly increases
- Structure
 - Few particles
 - Dominant pattern: silence-word
 - Small burst after muttering



Case 21: Particle-preceded answers and interspersed particles



MI: Now try: tah think of wo:rds
that begin with tha letter (0.1)
e:ll? (0.1) ehz in Li:nduh. (0.4)
Start no:w. h
(0.3)

MR: Oka:y. **la:wn** (0.6)

MR: u::o:h (0.7)

MR: **le:dge** (0.4)

MR: uh

MR: **lea:dership.** (0.6)

MR: u::m (0.6)

MR: **lea:f h** (0.6)

MR: u::h (1.1)

MR: °o:h°

MR: **li:nenss** (0.6)

MR: u::~h

MR: lo:h- u:h **loa:n** (0.7)

MR: u::~h(m) (0.5)

MR: **li:ke** (0.6)

MR: u::~m (0.9)

MR: °u::~h° (0.7)

MR: hhh (3.9)

MR: **lo:nely** (0.3)

MR: u::m (4.2)

MR: **life ↑ li:ku::h** (3.9)

MR: **lea:ve h** (2.4)

MR: u::~h (0.5)

MR: **loo:k** (1.7)

MR: °u::~h°

MR: **la:ck** (0.7)



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Case 21 (continued)

MR: u~::~:h(m) (1.9)
MR: loo:t. (0.6)
MR: °u:h° (3.8)
MR: °u~::~:h° (0.2)
MR: li:ckri:sh? (0.6)
MR: u::h (6.6)
MR: li:klihoo:d? (0.6)
MR: u::~:h (1.0)
MI: Oh↑ka:y tha minute's u:p.
h [n-]



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Case 21: Comments

- General features
 - Initial burst (four words)
 - Second burst (three words)
 - Length of silences roughly increases
- Structure
 - Predominant patterns
 - Silence-particle-[silence-particle]-silence-word
 - Silence-particle-word



Contents of response latency

- Silence, particles, mutterings may serve (different) interactional (and possibly cognitive?) functions
- Particles may
 - Display co-orientation (e.g., by content or filling silence)
 - Maintain rhythm of production – sometimes appear to take the place of words (Maintain readiness?)
- Rumination and muttering
 - Display orientation to task
 - Knowledge of task requirements
 - Evaluation of performance
 - May locate new associative clusters?
 - Sometimes followed by new bursts of words



Concluding comments: Describing structure of response latency

- The latencies for these cognitive tasks are relatively simple compared with those for survey questions
- To describe structure
 - Timing of silences – and total pauses -- must be precise
 - Determine which particles are “synonyms”
 - Distinguish content of muttering and distinguish muttering from particles
- Need sequential analysis to describe patterns and summary measures of structure
- Comparisons among different cognitive tasks is challenging
- Challenges for survey questions greater still



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