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Interpreting "I don't know" use by persons living with dementia in Mini-Mental State Examinations

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ABSTRACT

Objective: We investigate dementia patients' use of "I don't know" (IDK) in Mini-Mental State Exams (MMSEs) using objective linguistic indicators to differentiate IDK signalling lack of knowledge (LOK) from IDK used to hedge responses, affect exam progression etc. We hypothesize that increased proportional use of LOK-IDK correlates with worsening dementia severity.
Methods: 189 IDK tokens were extracted from 72 MMSE interactions and coded for linguistic/social characteristics. A data-driven, discourse position/relation-based functional taxonomy for IDK in MMSE was developed and the resulting functional distribution was subjected to multiple logistic regression.
Results: Use of LOK-IDK (vs. non-LOK-IDK) is significantly correlated ($p = 0.01$) with clinicians' subjective ratings of patients' dementia as 'severe' vs. 'mild'/'moderate', indicating that objective sociolinguistic criteria approximate physician judgments. 92% of 'severe' patients' IDKs signalled LOK, compared to only 68% of 'mild' patients', suggesting that uncritical interpretation of IDK as signalling LOK would result in 8–32% of IDK responses being mis-scored.
Conclusion: LOK and non-LOK uses distinguished on the basis of reliable, objective usage patterns are differentially distributed among dementia severity groups.
Practice implications: LOK-IDK serves as a supplemental indicator of dementia severity. Correct interpretation may improve diagnostic accuracy and allow clinicians to respond supportively during cognitive assessment.

1. Introduction

Clinicians report uncertainty in differentiating pathological, progressive cognitive impairment (i.e. dementia) from cognitive decline associated with normal aging, functional memory disorders, and depression [1–3]. This lack of confidence may stem from providers' discomfort with explicit cognitive assessment, a potentially embarrassing [2] or outright confrontational [4] process that is face-threatening to patients [5,6] and often exposes stigmatized cognitive deficits [7]. However, few dementia-specific, evidence-based communication curricula exist to assist providers in the negotiation of communicative barriers to productive cognitive assessment [8,9].

Recent work suggests that subtle differences in the way patients respond to conversational prompts may provide reliable cues to the presence and severity of cognitive impairment. Specifically, impaired patients' atypical use of "I don't know"—a multifunctional phrase that can be used to disavow knowledge, signal speaker stance and affect discourse organization [10]—may hint at underlying cognitive dysfunction. Mikesell's [11] conversation analysis of a frontotemporal dementia patient's routine interactions in non-clinical environments contrasts this individual's appropriate and problematic uses of "I don't know" (henceforth IDK) as a response to WH-questions (i.e., interrogatives constructed with "who", "why", "how", etc.). The problematic uses occur in response to questions that have clearly accessible answers, either based on the subject's current activity (e.g., "What are you reading?"), his close relations (e.g., "What does your daughter do?"), or his prior demonstrations of knowledge. They are inconsistent with the conversational task at-hand and frustrate the natural progression of discourse, similar to resistive IDK uses in child mental health consultations [12,13]. In the context of cognitive impairment, however, Mikesell claims that her subject is unlikely to be intentionally resisting a line of questioning. Based on the frequency of his inappropriate IDK uses and his interlocutors' treatment of these uses (usually involving elaborate

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repair sequences), she asserts that their occurrence should be taken as evidence of the subject's impairment.

Elsey and colleagues [14] offer additional support for IDK's utility in assessing cognitive impairment through their study of its production in memory clinic interactions in the UK. Focusing on the open-ended assessment portion of the visits, they find that IDK production frequency is significantly higher in those with cognitive impairment as compared to those with deficits attributable to functional memory disorders. However, Elsey and co-workers did not undertake a functional analysis of IDK. They treated all IDKs as interchangeable, even though linguists have repeatedly shown IDK to have two macro-roles: 1) as a claim to a cognitive state (= lack of knowledge), and 2) as a non-cognitive interactional device (= resistance strategy, epistemic marker, turn-exchange signal etc.) [15,12,13,16,17]. Furthermore, by excluding the formal assessment segment of the memory clinic visit, they discounted IDK tokens appearing in relatively standardized question sequences such as the Mini-Mental State Examination [MMSE [18]] which is commonly used by primary care providers [19]. Analysis of precisely these IDK instances could be especially informative for practitioners. By providing principled criteria for consistent IDK interpretation, a function-based analysis of IDK use in formal cognitive assessments has the potential to improve reportedly questionable [20] test reliability.

In order to further assess the diagnostic value of IDK in the context of cognitive impairment consultations, we present a quantitative, function-sensitive analysis of patients' IDK production in MMSEs. In doing so, we provide objective, trainable patterns for IDK interpretation in cognitive impairment assessment. Building on Mikesell [11] and Elsey et al. [14], we hypothesize that proportionally increasing use of lack of knowledge (LOK) IDK (as opposed to its use as a non-cognitive interactional device, see Section 3.1.2) will correlate with higher physician-assessed cognitive impairment severity. Our quantitative evaluation and descriptive elaboration of this relationship will add another tool to the cognitive impairment assessment repertoire, thus assisting clinicians in the task of recognizing and stratifying cognitive impairment.

2. Methods

2.1. Sample

We analyzed 72 audio-recorded and transcribed physician-patient interactions selected from a large database of naturally occurring ambulatory care visits: the Verilogue corpus [21]. Our secondary data analysis of the selected Verilogue interactions was exempted from further review as non-human research by the Michigan State University Institutional Review Board (IRB# x12-362e/APP# i040882). All US-recorded interactions meeting the following criteria were included in our sample: 1) the physician submitting the recording identified 'dementia' as the primary condition being addressed during the visit; 2) the physician assigned a subjectively determined severity level ('mild', 'moderate', or 'severe') to the patient's cognitive impairment; 3) the visit included at least a partial MMSE administration as defined by the use of standardized assessment questions; and 4) the patient produced at least one transcribed instance of "I don't know" in response to an MMSE question (as determined by an automated search for the string "don't know" co-occurring in a patient-uttered turn with an overt or implicit "I" subject pronoun). The included interactions were recorded from 2009 to 2013, and submitted by both neurologists and primary care physicians. Patient demographic characteristics for our sample are given in Table 1. Exhaustive manual extraction of all patient-produced IDKs from the MMSEs in these interactions yielded a final set of 189 fully codable IDK tokens. Though an *a priori* power analysis could not be performed for lack of reliable effect size estimates in the literature (i.e., there were no studies reporting distributions of IDK across cognitive impairment severity levels), this sample size is comparable to those reported in previous quantitative studies of IDK variability [10,22].

Table 1
Sample demographics at the subject level, total subject N = 72.

Parameter	Value	$N_{subjects}$	Proportion
Gender	Female	47	65.3
	Male	25	34.7
Race	Non-white	13	18.1
	White	59	81.9
Age	55–74 years	20	27.8
	75+ years	52	72.2
Severity level	Mild cognitive impairment	18	25.0
	Moderate cognitive impairment	39	54.2
	Severe cognitive impairment	15	20.8
Home circumstance	Lives alone	11	15.3
	Lives in extended care facility	9	12.5
	Lives with caregivers/family	52	72.2

2.2. Coding

2.2.1. Linguistic coding

The two authors, both trained variationist linguists with prior experience in IDK analysis [10,12,22], coded each of the 189 IDK tokens for a series of linguistic factors: 1) phonetic form; 2) boundedness (i.e. association with additional content in the same clause); 3) prosody (i.e. stress patterns conveyed by emphatic use of volume and vowel quality); 4) pronoun presence/absence; 5) adverbial modification; and 6) discourse function. Codes for 1–5 are given along with illustrative examples in Table 2; discourse function is detailed in Section 3.1. All 6 of these factors have been shown to affect the distribution of IDK in prior work [10]. The first author was responsible for coding factors 1–5. She performed iterative passes through the data focusing on one variable at a time whilst being blinded to her prior codings of other variables. In rare cases of unclear assignment, almost exclusively pertaining to phonetic form, the authors discussed and jointly assigned the token. The use of a single, primary coder can be justified for these variables as the same coders have achieved inter-rater reliabilities in the 87–98% range in prior IDK datasets [22]. In contrast to IDK's linguistic characteristics (1–5), IDK's discourse functionality is known to vary between conversational contexts [22]. Thus, to yield accurate descriptions of impaired patients' IDK usage in MMSEs, a *de novo* function coding protocol was established by means of an in-depth qualitative analysis (see Section 2.3).

2.2.2. Social coding

Following the linguistic coding process, each IDK token was associated with the following social factors provided as meta-data in the Verilogue corpus: patient gender (male vs. female); age category ($\leq$74 vs. $\geq$75); and severity of cognitive impairment ('mild' vs. 'moderate' vs. 'severe'). Age and gender have been shown to affect IDK distribution in previous research [10]; severity of cognitive impairment served as our key independent variable in the quantitative analysis. Patient age was given as $\leq$74 vs. $\geq$75 of age in the database for privacy reasons and could not be recoded