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An Aboriginal English Ontology Framework for Patient-Practitioner Interview Encounters

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Abstract

Current diagnosis, treatment and healthcare delivery processes in Australia are dominated by long established westernized clinically driven methods of patient-practitioner interaction. Consequently this dominant healthcare provider influence contributes to risk of miscommunication, misinformation in patient records and reciprocal misunderstandings that go unrecognised as such. For Indigenous communities, inadequate health literacy (HL) and a pervasive semantic disconnect are major barriers. Overcoming these barriers in the primary care setting presents opportunities to deliver appropriate timely and more effective care. We propose an e-health framework that enhances the Patient-Practitioner Interview Encounter (PPIE) through the use of a patient-centric linguistic interface using semantic mappings between Aboriginal English (AE) and Standard Australian English (SAE). This will ameliorate communications and interactions, so meeting the needs of all stakeholders (Patients, Physicians, Nurses, Allied Health Professionals and their Non-Critical Carers) engaged in Indigenous patient-centric primary care. It provides healthcare practitioners and their Indigenous T2DM patients with a new platform for two-way educative sharing and knowledge exchange that will increase mutually productive treatment, care and management expectations.

1. Introduction

From a videotaped clinical interaction study involving volunteer Aboriginal patients Cass et al. demonstrated that miscommunication is pervasive, and that trained interpreters provide only a partial solution. In-depth post-clinical interaction interviews of

individual patients and health workers showed that a shared understanding of key concepts was rarely achieved and miscommunication often went unrecognized[1].

Miscommunication is not uncommon within professional groups, even those where cultural and language differences are ostensibly absent. Doctors and nurses struggle with a vocabulary which is accommodating an ever-growing clinical terminology system replete with acronyms. The vocabulary of medicine has its roots in Greek, Latin and Norman wordage, littered with complex labels and strings added over time as the science of medicine has evolved; and technological change has brought new nouns, adjectives and verbs to the lexicon. The Mayo Clinic is heading-up the effort to produce the 11th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD), scheduled for release in 2015[2]. The previous 10th edition was published in 1992 when the worldwide web was only just beginning to emerge. The new edition work is focused on simplifying and codifying linguistic variation, abbreviations, and synonyms so that standardized recording and transactional detail becomes semantically consistent and valuable to professional practitioners and patients.

The prospect is that a healthcare practitioner will quickly identify keywords and thereby instantly access guidance for those treatments that have worked the best, statistically, for other patients with similar complaints around the world.

The ICD work however is predicated on a fairly high audience and user level of health literacy and does not necessarily offer a direct solution where health literacy barriers impede the quality and value of PPIE. Notwithstanding this, it will ultimately represent a valid source for the formal import of medical domain thesauri in the process of PPIE ontology mapping and

semantic layering. There is however a high risk that the pace of change represented by ICD-11 will further exacerbate the ‘digital divide’ that adversely affects Indigenous communities already disadvantaged through low levels of engagement with ICT and limited health literacy.

2. Background

The Semantic Divide

Within the PPIE involving Aboriginal patients, the meaning of statements made by patients and practitioners may at times be ambiguous. If unrecognized, that ambiguity may impose harm or at least a less than effective healthcare outcome. There is also another potentially hidden bifurcation of semantics in the PPIE. Trudgen has alluded to it in his book [3] when he discusses historic failures of practitioners to discover and use ways of explaining the reasons that certain physical ailments occur and equally the reasons for pursuing specific treatments and medications. If a patient wishes to know and is prepared to ask what a piece of diagnostic information ‘means’, the likely response will be a clinically based explanation. If that explanation is also accompanied with a prognosis, a second ‘meaning’ is conveyed. In other words, “what does this mean?” becomes synonymous with “what are the implications for my future health?” These examples also simplistically skate over the AE and SAE communications and barriers and circumstantial realities.

Ontologies and their applications

The World Wide Web Consortium (W3C) offers one of the more coherent definitions of ontology: *An ontology defines the terms used to describe and represent an area of knowledge. Ontologies are used by people, databases, and applications that need to share domain information (a domain is just a specific subject area or area of knowledge, like medicine, tool manufacturing, real estate, automobile repair, financial management, etc.). Ontologies include computer-usable definitions of basic concepts in the domain and the relationships among them.* [4]. A substantial part of ontology development comes from lexicography; but as discussed, communication is not about words alone. Cultural differences within the specialized dynamics of health care interactions can often combine with the influence of ‘power distance’ to devalue patient participation in the dialogue. Physicians generally still favour face-to-face interviews with their patients; but practicalities and a host of social factors are inviting other options. Studies of ontology applications potential include fixed and

mobile conversational support tools, automated clinical guideline services, personalization of patient treatments and care, self-management and home care help systems [5-10].

Anatomical and physiological experiences, feelings and conditions perceived and described by patients as a routine part of westernized primary care practice symptom identification and diagnoses are not commonly volunteered in a comparable manner by Aboriginal patients and often do not translate reliably when they are discussed [3]. Western medicine explanations of the organs and the functions of the body have no equivalent perception, thereby complicating the dialogue of T2DM diagnosis, treatment and care. It is the communication of diagnosis, treatment and care, not the health care process itself that needs to be changed as illustrated by Lowell[11]. It is proposed therefore that in the professional clinical aspect of the dialogue, the ontology can only rely upon mapping SAE diabetes guidelines to the new AE ontology. A matching and mapping process is therefore required so that the parties to the dialogue both share the same understanding. Inversely, the AE dialogue ontology, mapped to SAE clinical reporting, will be used to inform and advise various concerned local and remote healthcare practitioners/entities. This advice and information may include patient and family AE-generated responses, while preserving clinical meaning and healthcare value. In sum, the process objective is semantic interoperability. It is therefore vital that semantic translation accuracy is anticipated and protected throughout the design process. Semantics alone however are not the only challenge. Any ontology serving this function will require interoperability with a syntactic layer capable of dutifully representing the context of the cross-cultural dialogue.

3. Methodology

The pivotal focus of the sociolinguistic effort and pragmatics contribution to the dialogue ontologies will be T2DM diagnosis, treatment and care. The principal aim for the T2DM ontology is the application of clinically approved guidelines to navigate through diagnosis, treatments, and care working with and within established Australian national clinical care guidelines. These will eventually map to PPIE conversational modality guidelines in the AE ontology. Australian General Practice and practitioner training and published guidelines are consistent for diagnosed T2DM patients[12-14]. In our preparatory research, we

are collaborating with diabetes educators, chronic disease program advisors, Aboriginal education health and nurse training groups, and Aboriginal literacy experts. We are also able to merge the guidelines with several complementary accredited paper and multimedia education and training products. These are contemporary communications tools from dedicated Aboriginal diabetes management programs, an Aboriginal nurse training package provided by a Certified Diabetes Educator (CDE) and both teaching and student classroom materials focused on elevation of Aboriginal English as a valued dialectal instrument.

The modeling approach for the ontologies effectively borrows certain features from the work of others (Sidhu[15], Meersman [16], Ng and Wong [17] and Barrett[5]) notably because of the common applications characteristics of language translation in the healthcare environment. This model however is more focused on the combination of semantics and behavioral pragmatics than on written and spoken word translation and formal grammar construction. There is a slight interface benefit from its ultimate user conversational modality which represents a hybrid/derivative lexical relationship; but complexity prefaces this objective when a number of cultural interaction barriers are encountered.

Aboriginal English Ontology

The Aboriginal English AE ontology tree is also prepared with the mapping to SAE T2DM clinical guidelines in mind. Figure 1 gives the upper class scope, extending into subclasses shown in figures 2 through 6. These are expressive of the complexity at play within the cognitive processes and socio-cultural differences between Aboriginal AE speakers and non-Indigenous SAE speakers.

Community Healthcare Ontology for T2DM

Figure 7 presents the full healthcare ontology tree. It should be noted that the directional influence of the healthcare ontology is toward the specific chronic

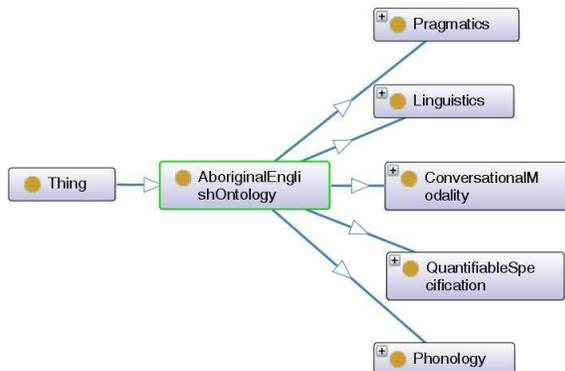


Figure 1 Aboriginal English Ontology

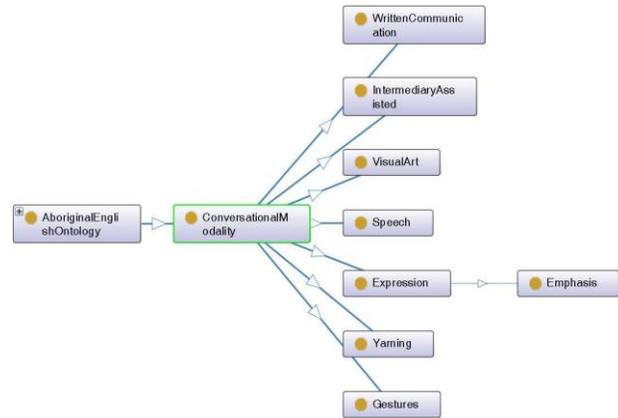


Figure 2 AE conversational modality

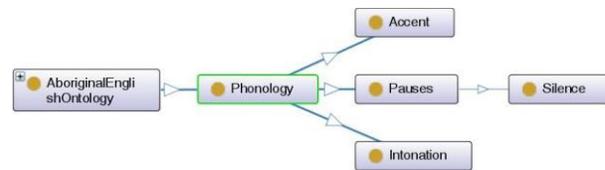


Figure 3 Phonology (hearing, sound)

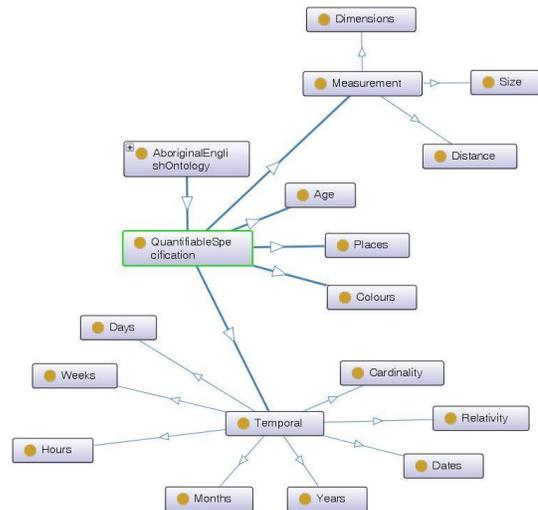


Figure 4 Quantifiable specification (measurement)

disease of T2DM with an intention to map to Aboriginal English. Therefore the subclass properties are clinically biased toward Aboriginal T2DM relationships.

4. Discussion

In our early reviews of AE we have discovered an infinite and intricate combination of semantic, syntactic and pragmatic challenges with many permutations of

linguistic patterns. Table 1 provides a data sample, giving a variety of representational types that may influence the conversational modality within the PPIE.

The consonant patterns mentioned above may vary regionally; and in the third one listed, we see the common word initial change so that AE pronunciation differs, with ‘b’, ‘p’ = ‘v’, ‘f’ in SAE. AE also commonly applies change to word class, in the instance shown the SAE noun becomes an AE verb. Irregular verbs are commonly formed via analogy with regular verb forms as shown with the word ‘caught’ equating to the past tense ‘caught’. The copula; e.g. *is, am*, is not required in AE. Transitive object marking applies to verbs that are sometimes marked for having an object (a noun to follow). Measurement of space and time is typically non-specific. Expression of quantity uses sound effects, usually with elongation. All AE past tense words are frequently made to look like the first (person singular). Redundancy marking frequently occurs as a marker of previous or assumed information which is not repeated. ‘What’ replaces ‘why in many interrogative sentences. Plural marker ‘s’ is not always used but may be used when there is no quantification. The second person pronoun may use the plural marker ‘s’.

One of the several challenges is the creation of sufficient fluidity in the function and relational aspects of the ontologies. The embedded discipline of existing clinical guideline compliance for instance infers a chrono-linear step by step checklist process, while recognising variables that will create deviations and diversions. Effectively the AE PPIE support model will anticipate and accommodate more diversionary influences, partly illustrated by the AE data sampling above and perhaps in contrast to past practices and preferences of healthcare practitioners.

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Table 1: Comparison of selected Aboriginal English pragmatic syntax and Standard Australian English. Selected sources: [18-21]

Syntactic/Pragmatic role/relevance	AE representation	SAE comparison
Word	Camp	Home
Word	Mob	Group
Word	Lingo	Aboriginal language
Words/phrase	Sorry business	Ceremony associated with death
Words/phrase	Grow (a child) up	Raise (a child) up
Word	Growl	Scold
Word	Gammon	Pretending, kidding
Word	Cheeky	Mischievous, aggressive, dangerous
Word	Solid	Fantastic
Phrase	To tongue for	To long for
Pronunciation	Enry's at	Henry's hat
Consonant pattern	Dere	There
Consonant pattern	Dat	That
Consonant Pattern	Bight	Fight
Word class change	Don't liar dad	Do not lie dad
Irregular verb use	We caught snakes	We caught some snakes
Zero verb 'To be'	Dey poisonous	They are poisonous
Transitive Object marking	Dey catchem fish	They catch fish
Transitive Object marking	Then when em startem up dat motor	Then when they start the car engine
Quantification	An dere was a bi-i-ig mob dere	There was a large group of (people etc) there
Tense	We was	We were
Redundancy marking	Ding	Thing
Question forms	What are you cutting dat, you cut dem small or sumpin?	Why are you cutting that? Are you cutting them into small pieces?
Plural marking	We seen lots of snake. I seen youse. We see monkeys.	We saw many snakes. I saw you. We saw some monkeys.

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