Practical Applications of Controlled English in a Tactical Environment

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*Abstract* — As warfare progresses to a more unconventional environment, maintaining dynamic military intelligence is critical for leaders in the field. Advances in simplified computer languages known as Controlled Natural Languages create opportunities to improve intelligence gathering and dissemination. We have envisioned a living knowledge base that records biographical data on insurgents, contacts, and civilians in the field. The soldier would have the ability to add to, remove from, or edit existing information using a programming language that is designed to be quickly understood. With the conversational interface MOIRA system developed under the International Technology Alliance program [1], the user can request graphical and visual information concerning interpersonal, inter-village, or inter-tribal networks, IED and enemy force heat maps, and relevant biographical data of any subject within his/her area of operations. This can be potentially adapted to existing technology such as a Blue Force Tracker, simple GPS systems, or Google Glass.

# Solving the Problem

As current military intelligence stands in the United States Army, accessing vital mission specific information is neither expedient nor convenient to the lowest levels of leadership. Available at only the battalion level and above, intelligence operations “are generally informal, providing detailed products only when time and resources permit” [2]. This paper introduces a knowledge base concept that can remedy these shortcomings by providing timely and relevant data to users in the field using existing modern day and realistic near-future technology.

# Knowledge base Concept

To be readily useful to units in the field, this biographical knowledge base must contain a wealth of easily digestible but relevant biographical information, as well as convenient and timely interaction between the knowledge base and users on the ground. Each biographical entry will consist of four main categories of information: the physical description of the person, relevant information concerning their personal life and work, their relationship network, and comments left by previous users. All this information should be presented succinctly to the user in a profile reminiscent of common social media, where relevant information can be easily distinguished. One of the most important aspects of this knowledge base is that it should be editable by a variety of users, from military intelligence officers at the forward operating base, to squad leaders or platoon leaders on the ground.

Users in the field will interact with this knowledge base using primarily a speech-to-text translator, a Controlled English interpreter, and a portable display, either through an existing platform such as the Blue Force Tracker or a newer technology like Google Glass. A user should be able to communicate verbally with the knowledge base and create or edit entries real-time. For example, a user should be able to say to the conversational interface:

“Create entry on a person named John, who has age 50, and has height 6 feet, and has black hair”.

The knowledge base will then create this new entry in Controlled English with a location and time-stamp, accessible to all units who operate in that same area. The Controlled English form would look like this:

there is a person named ‘’John’ that has ‘50’ as age and has ‘6 feet’ as height and has ‘black’ as hair colour.

The user can then go further and say:

“Create entry on person Mike, who has age 45, and has height 5 feet 6 inches, and is the brother of John, member of Shomali village”.

Which would be translated to:

there is a person named ‘’Mike’ that has ‘45’ as age and has ‘5 feet 6 inches’ as height and belongs to the network ‘Hursley Village’ and is brother of the person ‘’John’.

The knowledge base will then have two entries, with a clearly defined relationship between the two people that can be referenced by anyone else in the system. Realistically, the knowledge base will have thousands of these entries; all populated with information from the military intelligence staffs and amended by those on the ground who have personal relationships with the subjects.

# Benefits

As with all new technologies, this proposed knowledge base must have demonstrable benefits over the current system to warrant the significant research and development investment. First, were this knowledge base to be properly implemented, it would bring an unprecedented and persistent wealth of information to hand for every user in the field, greatly increasing a leader’s social effectiveness when interacting with civilians within their area of operations. This would allow for information persistence from commander to commander, deployment to deployment. Furthermore, this would allow the generation of “fringe information” that would not be necessarily available to a battalion intelligence staff, such as obscure relationship clues.

This “fringe information” would be key in strategic planning. Realistically, a user in the field could update the knowledge base with a tidbit that connects a village’s leadership to a known enemy operative. Friendly commanders would have access to this information immediately and could make educated decisions that would not otherwise be available to them through traditional intelligence gathering. In addition, the knowledge base could analyze a town’s relationship web and annotated biographical entries to provide clues as to their political inclination and friendliness to blue (friendly) forces. When pieced together by a CNL query framework, the knowledge base can provide an extremely in-depth relationship web and extrapolate very useful and previously unknown intelligence.

We created a mock knowledge base system ourselves in Controlled English to evaluate this concept. Over the course of a week, we established a biographical framework that defined a person by a variety of attributes, wrote a complex set of rules for a relationship model, and populated this knowledge base with fictional people. We learned that not only is the Controlled English structure ideal for creating a relationship model that would be useful for intelligence operations, but that it is easy to learn and straightforward to use. Any soldier would find the Controlled English knowledge base valuable for quickly and easily accessing and manipulating data without anything more than a passing familiarity with computers. On a broader scale, Controlled English allows groups to define the parameters of their knowledge base to fit their specific needs. A military intelligence staff may require a different knowledge base framework than a city police department. Without too much work, the group could use Controlled English to redefine the knowledge base to suit their needs without the input of trained computer science professionals.

# Challenges

Three main challenges exist with such a large and uncontrolled knowledge base in this current form. First, the security of the knowledge base in a combat environment can be a major obstacle to implementation. The risk of enemy forces having access to the knowledge base through lost equipment may be unavoidable. Second, existing speech-to-text technology may not be subtle enough to prevent significant errors in transcribing information to the knowledge base [3]. Third, negligent or ignorant users could potentially compromise vital data.

The second problem may be addressed by advancements in the technology offered by speech-to-text programs. The third problem can be addressed by stringent security protocols that restrict users from editing profiles of subjects outside their area of operations or limiting users to only edit information that has not already been confirmed by intelligence officers. At the least, each of these issues needs to be individually addressed before the knowledge base can deploy in a combat scenario.

# Expanded Applications

The following is a list of applications that would benefit from a CNL knowledge base in the foreseeable future:

* Criminal police knowledge bases in major cities
* Special operations forces tasked with foreign internal defence
* CIA, FBI, MI5/6 foreign intelligence gathering
* NSA internal defense, internal intelligence gathering

##### Acknowledgment

This research was sponsored by the US Army Research Laboratory and the UK Ministry of Defence and was accomplished under Agreement Number W911NF-06-3-0001. The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the ofﬁcial policies, either expressed or implied, of the US Army Research Laboratory, the US Government, the UK Ministry of Defence or the UK Government. The US and UK Governments are authorized to reproduce and distribute reprints for Government purposes notwithstanding any copyright notation hereon.

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