MOBILE PICTOGRAPHS FOR DISASTER COMMUNICATION: INCLUSIVE PUBLIC SERVICES

POLICY BRIEF

POLICY ISSUES

Illiterate populations (e.g. 30% of Sub Saharan Africa and Asia) are marginalized with very little or no policies and practices in place to include them in disaster communication. Illiteracy is also representative of poverty. It satisfies its inclusion as an indicator of vulnerability to disasters. Urbanization, with the poor seeking opportunities in the cities, calls for developing inclusive societies for all; i.e. smart cities. Moreover, those foreign to the local language (e.g. tourist) and with temporary traumatic mental disorders (i.e. refugees), termed as functionally-illiterate, are equally marginalized. Therefore, text or voice-based messages are not comprehensible for everybody. **Smart Government must include linguistically challenged in public information and services**.

In this, pictographs (pictograms or symbology) can play an important role in disaster communication.

Alerting and Reporting ⇒ UN-OCHA Noun Project icons to construct messages; for authorities to alert the public and the public to cry for help

Cultural context ⇒ select comprehensible and appropriate icons for defining incident, severity, certainty, urgency, response, and needs

Smart mobile devices ⇒ Graphical interfaces on mobile devices have shown great impact

Supporting low-literate and functionally-illiterate populations

Interoperability ⇒ Emergency data exchange standards are be useful in defining the key data elements of a national pictograph dictionary

Based on the research and findings of a field study in Sri Lanka and the Philippines we derive blueprints for successful disaster communication with pictographs and have proven pictographs to be useful in communicating disasters.

TARGET POLICY MAKERS: National Disaster Management Organizations and Emergency Communication Planners

RECOMMENDATIONS

NATIONAL POLICIES AND PLANS - Amend national emergency communication plans and policies to include modalities of disaster communication to support linguistically challenged; especially, life threatening information in alerting and incident reporting.

PICTOGRAPH DICTIONARY – Develop, using a cultural context, national or regional pictograph dictionaries (or thesaurus) to be used with ICTs by authorities in alerting and the public in reporting incidents.

RESEARCH & DEVELOPMENT- Very little or no research has been carried out on the comprehensibility and appropriateness of pictographs (or other medium) for including linguistically challenged populations in disaster communication; hence, more resources should be invested for research and development.

THE RESEARCH

INTRODUCTION - Pictographs are known as as efficient means to strengthen recognition. Based on (Norman, 1990), Tijus et al. (2007) summarize this as ,"a pictogram is better than a label, and recognizing an image is easier than reading text". Pictograph-enhanced medicine instructions, in South Africa, - people responded well and locally designed symbols were preferred to reached a higher understanding (Dowse & Ehlers, 2004). Pictographs helped people with both good and bad numericity (Kreuzmair, Siegrist, & Keller, 2016). Graphical interfaces on mobile devices have shown great impact in studies in Africa and India in the field of health and banking applications (Medhi et al., 2011). The "mobile4D" disaster alerting and reporting system, for instance, demonstrated the success of text-free components using pictographs (Frommberger & Schmid, 2013).

Meng et. al (2010) studied cognitive issues on chinese disaster symbols with recognition ability under the condition of multiple graphic warning symbol-setting and the factors contributing to identification efficiency. Ritsumeikan University worked on disaster pictograms to address people unfamiliar with local language and evaluated the use in simulation experiments (Kusano, Izumi, & Nakatani, 2014). The Local Flood Early Warning System (LFEWS) in the Philippines (Antonio et al., 2012) uses basic meteorological icons along with their text based messages.

Elizabeth Klute analyzed the use of symbols in disaster early warning based on the experiences during the 2010 Haiti earthquake (Klute, 2012). Robinson, Roth, & MacEachren (2011), were one of the first to evaluate US Federal Geographic Data Committee (FDGC) published ANSI INCITS 415-2006 set of symbols in their efforts to create consistent map symbols for disaster situations. In 2012, the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) created 500 humanitarian symbols to be used by relief workers. However, their applicability to low & functionally illiterate audiences needs to be investigated. In general, disaster symbols are restricted to indicators on maps.

METHOD – This study is based on two basic use-cases for pictographs: **alerting** public of risks and the public **reporting incidents** asking for assistance. We worked with sixty (60) Illiterate community members belonging to the Sarvodaya Shramadana Movement (Sarvodaya), in Colombo and Ratnapura Districts of Sri Lanka. Also worked with 20 deaf and illiterate community members in Metro Cebu, Philippines; associated with the Deaf Disaster Assistance Team - Disaster Risk Reduction (DDAT-DRR).

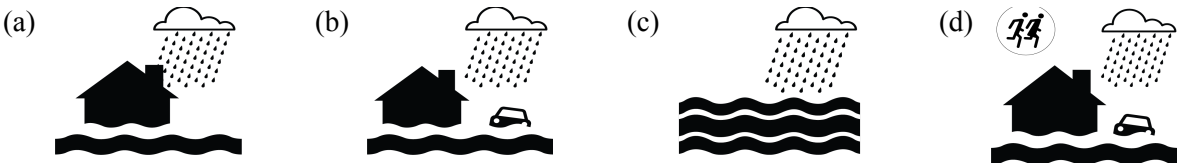


Figure 1. Pictograph variations for a flood incident indicating heavy rain with: (a) house for context, (b) enhanced context with house and car, (c) no context, and (d) enhanced context with response

RESULTS

Participants were presented with several analogous icons, in sets of five (05), then asked to describe and categorize them. Using flood as the common theme, complex pictographs were developed from the community selected icons. Several variations (e.g Figure 1 (a) - (d)) were presented to understand the comprehensibility and appropriateness as well as information concepts such as event, incidents, severity, certainty, response (action & time), urgency, and needs.

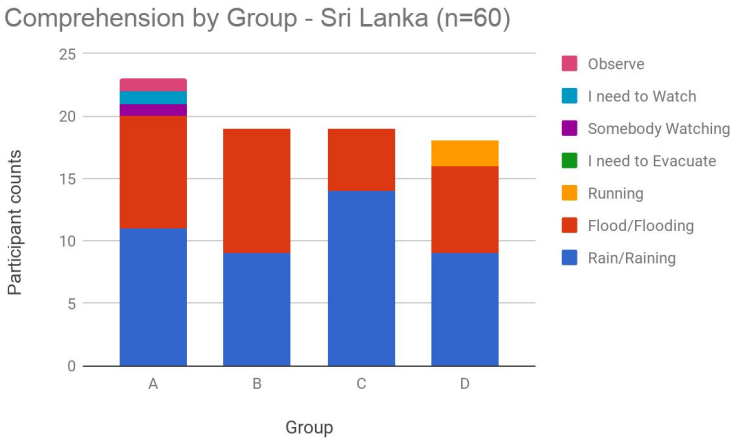


Figure 2: Comprehension counts - Sri Lanka

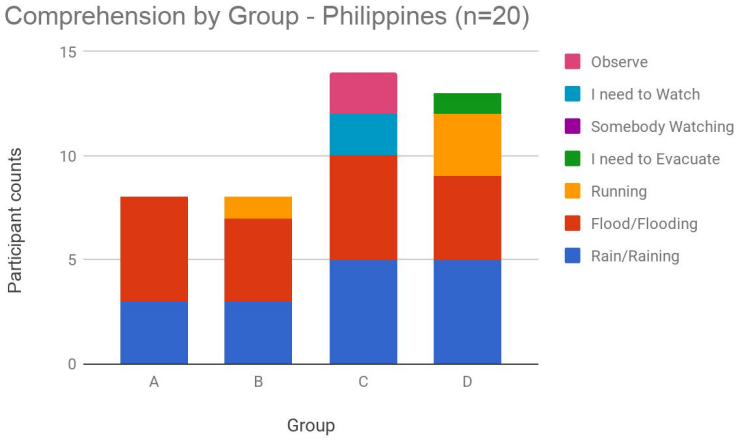
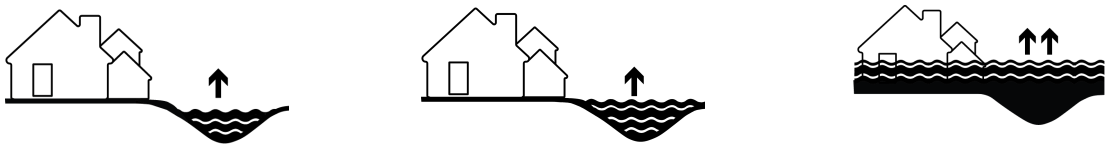


Figure 3: Comprehension counts - Philippines

The pictographs, in Figure 1 (a) - (d), were to present a heavy rain and flood incident. Results shown in Figure 2 and Figure 3 indicate that participants understood the event: raining and the incident: flooding. In the case of Sri Lanka, group (C) that used Figure 3 (c), in the absence of context (or reference), participants were less likely to interpret that it was a flood incident.

To determine whether the pictographs implied or revealed the need for any action, we asked the participants to describe the possible action they would take. Sri Lankan groups would “tell others”, “ask for help”, and “evacuate”. Participants in Group (A), some of them would watch the situation as well. The Deaf Filipino groups presented with Figure 1 (b) and (d) with the car as an addition context to the house, chose to “ask for help”, “evacuate”, or “seek shelter”. Participants who were presented with Figure 1 (a) and (c) chose to “watch” the situation because some of them live in boathouses (i.e. resembling pictograph in Figure 1 (a)) and others live close to the ocean. Hence, the absence of the reference of a car, in this local context, was simply another rainy day and not a flood. The evacuation response, with running male and female, was perceived as the most severe event by the Filipinos. However, the response icon did not seem to impact the severity in Sri Lanka. Statistical comparison between pictographs without a response action and with a response action shows that the later causes some confusion.

We presented the participants with three (3) pictographs, shown in Figure 4; i.e. river was observed to be rising, river has reached a critical dangerous level, and river has started inundating (flooding).



(a) Rising (b) Danger (c) Flooding

Figure 4: Pictographs presenting (a) river is rising (b) has reached a critical danger level, and (c) is flooding

When reporting an incident and requesting for required emergency response needs, the participants' reactions were somewhat as expected (see Figure 5). Thus, when the river was rising a significant number chose to observe and not report. When it reached a danger level, either continue to observe but, relatively, more of them chose to request for evacuation. With flooding, more chose to report incident requesting evacuation.

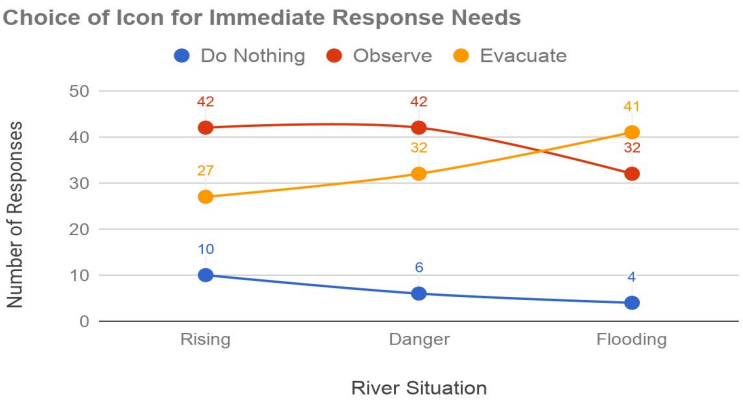


Figure 5: Choice of reporting response when river was rising, had reached a critical danger level, and begun flooding

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