Mobile Pictographs for Disaster Communication: Inclusive Public Services

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Why pictographs for inclusive disaster comms?



Source: https://goo.gl/oBrBtf

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~ 25% Sub Saharan Africa,
~12% Asia Pacific are illiterate



Source: https://goo.gl/fqczN9

- ~ 1.25 billion arrivals in 2016
- Forecast 1.6 billion in 2020



Source: https://goo.gl/sNrSgn

 > 75% countries speak > 5 languages

Pictographs to serve

- illiterates and functionally illiterates (linguistically challenged)
- Common modality for addressing multiple languages (e.g. alerting)

Inclusive disaster communication requires:

- 1. Amending national emergency communication plans to support linguistically challenged populations in disaster communication
 - a. Include alternative modalities of disaster communication; e.g pictographs
 - b. For share life threatening information; at least, alerting/reporting.
- 2. Research & Develop national or regional pictograph dictionary (or thesaurus)
 - a. To use with ICTs for authorities to alert and public to report incidents
 - b. Must be designed for the cultural differences



Research Question

"How do we design symbols, workflows and technology to communicate disaster information through pictographs such that it can be used by linguistically challenged populations?"



Research Agenda

- 1. Literature Review; Expert Consultations with Disaster Management Professionals
- Field Studies with Linguistically Challenged Populations (Sri Lanka / Philippines)
 - a. Sarvodaya Village Movement, Sri Lanka
 - b. Deaf Disaster Assistance Team-Disaster Risk Reduction (DDAT-DRR), Philippines
- 3. Developed and evaluated a prototypical dictionary (or thesaurus), for flood incidents, with the target users in Sri Lanka and the Philippines



Existing Pictograph Resources

- Usually designed for use on *maps* and/or signage, not for alerting
- Symbols often concentrate on *incident* and omit response actions. Not representing complex situations.
- Designed and evaluated with *professionals* in mind
- Not explicitly addressing illiterates / linguistically challenged

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UN-OCHA Humanitarian Icons







Guemil icon set



FDGC Emergency Symbols

Four communities in two countries



GARVODAYA Shramadana Movement Sri Lanka Urban Community Colombo, Sri Lanka

Rural Community Colombo Region, Sri Lanka

Rural Community Ratnapura, Sri Lanka







Deaf Community Cebu City, Philippines



Two Use-Cases



1. Incident Reporting

Person asking for help from the Emergency Management Services indicating hazard (threat) and Immediate Needs Emergency Management Services

2. Alerting / Warning

Emergency Management Center Warning the Public in the area indicating hazard and required response actions



Pictograph Layout with Mobiles in Mind



What is this and what would you do?



Comprehension by Group - Sri Lanka (n=60)

Group

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Group



Comprehension by Group - Philippines (n=20)

With and Without Context

Comprehension of Flooding

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- Adding contextual entities (house and car) adds to comprehension.
- Only 52% understood the meaning without context.



Group A 14 of 21





Group C 10 of 19



Comprehension and Context

Response Actions



- Additionally depicting a response action "evacuate" (right) caused confusion – comprehension rate drops
- However, understanding of what to do (correct response action) slightly increased – even if overall comprehension was lower

Comprehension of Incident



Comprehension of Response Action





Severity Understanding



Rated Most Severe

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Rated Least Severe



Time Comprehension

- Time representations are generally **not** correctly understood
- Several representations of "for six hours" were tested
- >95% understood this is "about time", but:
- Comprehension rate: 7.5% (for "in/for 6 hours")





Choice of Immediate Need when Reporting

Choice of Icon for Immediate Response Needs



Participants were asked to pick an icon to represent the immediate need for each situation: river is rising, reached a danger level and is flooding







Do nothing

Observe

Evacuate

Participant responses

when the river is:

Rising - observe or do nothing

at Danger level - mostly observe

Flooding - mostly evacuate but some said observe (perhaps exercise was not understood)

Use a coded water level gauge (colors and numbers)

Choice of symbol for reporting the number of



Choice of icon for representing victims



What does the chosen victim icon represent?



We asked the participants which of the three symbols would they chose to represent the number of **VICTIMS**?



We asked the participants whether the symbol they chose represented **FAMILY** or **PEOPLE**?

Local and Cultural Context



Cebuano (Filipino people) **living in boathouses** perceived the symbol as a **rainy day** and and **strong waves**



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Evil eye is a kind of **black magic** that is transmitted on victim overlooking. More precisely, by gazing negative energy and **negative thoughts are transferred or transmitted** to the targeted person.



Clocks — Bad Luck. In Chinese, saying 'giving a clock' (送钟 sòng zhōng /song jong/) sounds exactly like the Chinese words for 'attending a funeral ritual' (送终 sòng zhōng) and thus it is bad luck to gift clocks or watches.

Money vs OK local symbol for money



Conclusion

• Local Design:

• Pictographs must be designed locally with target audiences to address cultural differences

User-centered Symbology

- Usual recommendations for icon design might not hold for illiterates due to deficiencies in abstraction and categorization
- Level of abstraction
 - Choosing level of abstraction is crucial due to different cultural background and experiences

• Time and Numbers:

 Abstract concepts like time and numbers must be handled with care – important, but hard to communicate clearly

Response actions

• Usually not considered, but crucial part of the information

Limited success

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• Evaluations do not show required comprehension rates, even with professionals

Thank you!

More information at project page: <u>www.sahanafoundation.org/pictographs</u>

Literature survey available:

www.researchgate.net/project/Pictographs-for-Disaster-Communication

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