

Beyond emojis: an insight into the IKON language

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Abstract

This paper presents a new iconic language, the IKON language, and its philosophical, linguistic, and graphical principles. We examine some case studies to highlight the semantic complexity of the visual representation of meanings. We also introduce the Iconometer test to validate our icons and their application to the medical domain, through the creation of iconic sentences.

1 Introduction

Since its introduction in the early 1970s, textual computer-mediated communication (CMC) has been enriched by visual elements that express emotion and attitude: emoticons (sideways faces typed in ASCII characters), emojis (designed, like emoticons, to facilitate emotion expression in text-based conversation, but visually richer, more iconic, and more complex), stickers (larger, more elaborate, character-driven illustrations, or animations to which text is sometimes attached) (Konrad et al., 2020).

Graphic symbols have been extensively utilized in communication all over the globe, particularly on social media and instant messaging services. More recently, studies have examined the use of emojis in other dimensions. For example, consider the usage of emojis or symbols to gauge consumer satisfaction with a product or service in the business field (Paiva, 2018). Emojis have been investigated in the medical industry to assess patients' symptoms (Bhattacharya et al., 2019). Apart from Emojis - that are not considered a language by most linguists - there are also visual languages, that were created to enable a full visual communication (e.g.

Bliss, Zlango, iConji, etc.). Nonetheless, several limitations have been found in these visual communication tools. For example, some of them are based on national languages reproducing their inconsistencies and difficulties; some were conceived to be handwritten and so are very stylized and abstract; some have a too simple grammar, that does not allow sufficient precision in conveying complex meanings. The IKON language was conceived to address these limitations.

IKON allows semantic compositionality by joining icons (as in Bliss, LoCoS and Piktoperanto), the use of grammar categories (Bliss), and the consistent use of iconemes (as in VCM), high iconicity (as in AAC languages and Emoji). IKON aims to reduce abstractness and language dependency.

Our contribution has multiple aims: i) to examine IKON theoretical approach and its application to a few case studies based on semantic dimensions such as modality, verbs of motion, of perception, and of communication; ii) to present the Iconometer test, a crucial tool to understand how individuals interpret IKON language; iii) To propose an application of IKON in the medical domain through a bachelor's thesis project developed by a member of our team.

The remainder of the paper is structured as follows: section 2 briefly discusses examples of iconic languages and their semantic approach. Section 3 specifies IKON's theoretical approach. Section 4 brings a few case studies of our icons. Section 5 presents the Iconometer, the next step to evaluate the designed icons. Section 6 describes IKON sentences in the dentist-patient frame. Finally, conclusions are reported in section 7.

2 Semantic analysis in icon languages

Iconic languages have been used successfully in human-computer interfaces, visual programming, and human-human communication. They have, in most cases, a limited vocabulary of icons and a specific application. There are also “natural visual languages” that use logograms such as Chinese, Mayan, and Egyptian (Reale et al., 2021).

We will provide a short semantic analysis of Emojis, *Emojitaliano*, and Augmentative and Alternative Communication (AAC).

The most popular icons today are emojis, which roused discussions about to what extent they are a language and whether it is universal. Emojis are widely used to express the user’s communicative intent functioning as tone marking or as a word in a verbal cluster. However, emojis lack grammatical function words and morphosyntax. In spite of that, some consider it an emergent graphical language (Ge and Herring, 2018).

Emojitaliano is an autonomous communicative Emoji code born for the Italian language. It was created for the translation of Pinocchio (2017), launched on Twitter by F. Chiusaroli, J. Monti, F. Sangati within the *Scrittura Brevi* community (<https://www.scritturbrevi.it/>). *EmojitalianoBot* on Telegram then supported the translation project. It contains the grammar and dictionary of the iconic system. *Emojitaliano* consists of a repertoire of lexical correspondences and a grammatical structure predefined that reflects the content found in Pinocchio. It respects linguistic principles such as linearity, economy, and arbitrariness. *Emojitaliano* does not have a high degree of iconicity (similarity between form and meaning of a sign) because many solutions are the result of an idiomatic or culturally marked decision not related to human experiences (Nobili, 2018). For example, *emojitaliano* represents the abstract concept of *guilt* with man + woman + apple, representing the referent using a biblical and culture-specific metaphor.

The field of (AAC) has created various technologies to facilitate communication for people who cannot communicate through language in the standard way. Different approaches exist to develop AAC iconic languages. From the semantic point of view, these systems developed three ways to represent language: i) single meaning pictures ii) alphabet-based methods are often subdivided to include spelling, word prediction, and orthographic word selection iii) semantic compaction uses multi-



Figure 1: *We dual inclusive icon* (I-You). It is obtained from the *I* pronoun (1.P.SG singular) (left) and *You* pronoun (2. SG) (right).

meaning icons in sequences to represent language. Minspeak, for example, uses semantic compaction (Albacete et al., 1998; Tenny, 2016). Non-linear AAC has been proposed based on semantic roles and verb valency (Patel et al., 2004).

The attention of researchers now focuses on the automatic detection of icons’ meaning, using machine learning and word embedding techniques (Ai et al., 2017). Nevertheless, in the creation of a visual language, it is also essential to empirically assess the degree of polysemy of a given icon, how its meaning is conveyed according to different levels of knowledge of users, evaluating the ambiguity within the system (Dessus and Peraya, 2005; Tijus et al., 2007).

3 Creation of an icon in IKON

3.1 Methodology

IKON follows philosophical, linguistic, and graphical principles. IKON language aims to create a compositional, iconic, international, and language-independent system (see Reale et al., 2021 for a more detailed analysis).

3.1.1 Philosophical framework

The philosophical framework determines the principles and values at the core of the project. It then informs both linguistic principles (e.g., by using hyperonymic form to have a transcultural icon as in Figure 5 or representing semantically different concepts by different icons for language independence), and graphical guidelines (e.g., grey as skin color as in the icons presented below).

IKON is human-centered. In designing a concept or undefined events, generic humans are preferably used as participants, creating a similarity between the sign and our human experience.

IKON intends to be iconic and intelligible so as to be easily understandable by people of different backgrounds. That is, taking into account different cultural and geographic realities creating transcultural icons. Pictographic, highly iconic rep-

representations are favoured, while abstract symbols are used only when no better alternative is identified, or when it is already widely used (e.g. road signs).

IKON system aims to be inclusive, representing specific identities through the use of no discriminating symbols or generalization (e.g. specific icons and symbols commonly used to represent various genders), or by using unspecified and identity-neutral icons specified in the graphic guidelines.

3.1.2 Linguistic principles

Linguistic principles involve different linguistic dimensions: semantics, grammar and morphology, syntax.

The IKON lexicon is a core set of around 500 icons covering basic concepts, used directly to communicate complex ideas and, indirectly, as “building blocks” to create new “compound words” (Reale et al., 2021). As we will see, the list is continuously growing as from each meaning other meanings stem, if necessary, in a disambiguating process. For instance, from a typological point of view, there are languages that show more granularity than English within the number system. This is revealed the most in the pronoun system (Corbett, 2000). The dual inclusive pronoun - used to refer strictly to two people including the speaker - can be found all over the world and in different language families. It is common in Austronesian languages (e.g., in Māori *tāua* ‘I and you’) but also found in Upper Sorbian, a West Slavonic language (*mój* ‘we two’) (Corbett, 2000). In light of that, we decided to create an icon to represent the dual inclusive pronoun by using the icons for the pronouns *I* (first person singular) and *you* (second singular person) as shown in Figure 1.

IKON considers polysemy. Each semantically different concept found in our path has a different icon (e.g., to smell can mean “to produce smell” or “to perceive smell”, and we decided to create two different icons for those meanings). Moreover, the main sense of a word is preferred, because a more specialized, metaphorical, or idiomatic sense is often culturally specific (e.g., *to go away* is represented within its literal motion sense and does not involve other idiomatic usages such as *stop bothering someone*, *leave someone alone*. In this way, language independence - a crucial value of our philosophical framework - is increased.

At this point, we use a linear word order reflecting the linear syntax of natural spoken languages.

However, as previously mentioned, more flexible syntactic orders and even a bi-dimensional syntax are conceivable.

3.1.3 Compositional rules

A graphical-semantic interface accounts for a finite number of pictorial forms so as to assure coherence of the system. We go from the simplest icons to the compound icons.

Pictographic icons. When possible, icons are pictographic, that is a prototypical (Rosch et al., 1976; Croft et al., 2004) and conventional type of an item (e.g., the most telling representation of a window).

Abstract symbol. Sometimes an abstract symbol is used if it is widespread and more comprehensible (e.g., traffic signs).

Contextual icons. Some concepts and items might be easily recognized if represented within a given context. This kind of representation is called “contextual”. Contextual icons are built as visual scenes with several elements: graphic markers (such as arrows, circles, and color oppositions) pointing to one specific sub-element of the whole picture. In this case, what is highlighted is what it means.

Compound icons are more complex from a semantic point of view, obtaining meaning through various strategies:

Juxtaposition. Simple juxtaposition of two or more elements, which seems the emergent use of emojis (Ge and Herring, 2018).

Contrastive form. Sometimes a meaning is better understood in opposition to another meaning (e.g., *day* as contrasted to *night* with yes-no symbols to signal the intended meaning).

Hyperonymic icons. As complex as they seem, serve to understand complex concepts as a set of different but related elements.

Hyponymic icons. Hyponymic icons, on the opposite, highlight a specific member of the hyperonymic set. Ancient and modern visual systems present these strategies (Reale et al., 2021).

3.1.4 Linguistic resources

The preset forms and strategies described above enable a flexible framework that allows us to graphically encode meanings according to the analysis of semantic, semiotic and cultural needs. For a practical example see Figure 5 (Hyperonymic icon for *to thank*). Individuating the semantic frame of a lexical unit (Fillmore and Baker, 2010) - the core elements of a word meaning - is particularly essential if disambiguation of meanings is needed.

When it comes to verbs, it is also important to assess the semantic types and thematic role in the argument structure to include the appropriate participants and frames in the related icon. Most lexical resources contain a large amount of linguistic information that can be exploited: Wordnet (Miller, 1998) (semantic lexicon with definitions and lexical relations), FrameNet (Boas, 2005) (offers an extended amount of semantic and syntactic phrase specifications), Sketch Engine (Kilgariff et al., 2014) (a multilanguage annotated corpora resource). A limitation is that Wordnet and FrameNet are implemented only for the English language. However, they are becoming available in other languages. Other multilingual resources are also growing (Boas, 2005; Baisa et al., 2016). Thus, a more typological approach is needed and recommended to confirm hypotheses with respect also to our theoretical approach.

3.1.5 Graphic guidelines

The graphical guidelines are the the visible part of our project. For the most part they visually reflect the linguistic principles, and the philosophical framework, but also influence them due to graphic constraints. The main points are:

Vectorial. Readable at 30 px and at 4000 + px (vectorial).

Text-Free. In general, the text is avoided as much as possible, to keep language independence. There can be exceptions: letters, brands, proper names, sentences/words about phonetics, or linguistics.

Background Independent. No background is applied to the icons unless it is meaningful.

Colors. Palette of 24 colors and Black-and-White. Each icon exists also in black and white. To keep icons racially neutral, we use gray as skin color.

Pixel Perfect. All icons are aimed to be pixel-perfect on 48 by 48 pixels; diagonal lines are at slopes 1:1, 1:2, 1:3, or 1:6.

Arrows and lines. Arrows are purple, normally used to show one object inside one scene: solid arrows for emphasis; dashed arrows for movement. Lines dividing the two or more scenes are dotted lines, usually horizontal or vertical. Except when another angle makes more sense or is more practical.

Contrastive Icons. The contrast between 2 scenes is expressed by default through small symbols “yes-no” (green V or red X); the contrast between more than 2 scenes is expressed by default by graying out

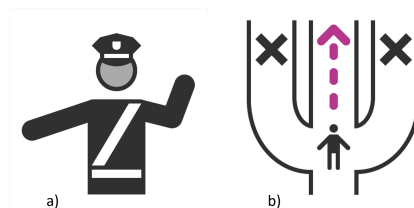


Figure 2: Initially proposed icons for the modal verb *must*.

(or crossing out) the contrastive scenes and circling the signified scene.

In the following sections, we present a few case studies, providing concrete examples of the process and semantic considerations that precede the design of complex concepts.

4 Case studies

A semantic criterion, namely the inherent conceptual content of the event, is used to group meanings and relative icons

4.1 Modality

Initially, the symbol of a traffic policeman in the position of giving instruction was proposed to express the modal verb *must* (Figure 2 (a)). Another option was an obligatory road signaled with a red arrow - an idea inspired by the nobel pasigraphy (figure 2 (b)). However, these icons did not seem intuitive enough.

The World Atlas of Language Structure Online (WALS) provided typological information to analyze how modality (situational and epistemic) is realized cross-linguistically. *Must* can be used to express epistemic modality - a proposition is necessarily true - or situational modality - a situation of obligation in which the addressee’s action (e.g., going home) is essential i.e., necessary. The following analysis is focused on the latter. *Must* can be decomposed in terms of the speaker’s intention, in the sense of the speech acts theory. The intention we focus on is the “speaker directives” (illocutionary force) which correspond to concepts like “obligation”, or “advice”.

Non-verbal communication is a source of visual language. A pointing gesture is a movement toward some region of space produced to direct attention to that region. Scholars suggest that pointing remains a basilar communicative tool throughout the lifespan, deployed across cultures and settings, in both spoken and signed communication (Clark,



Figure 3: Proposal for *must* based on the index-finger gesture.

2003; Camaioni et al., 2004). The communicative role of hand gestures is evident in the fact that hand-based emojis are the third most used type of emoji (Gawne and Daniel, 2021). However, there is limited literature on the diversity of forms and meanings, causing the exclusion of new culturally motivated encodings (Gawne and Daniel, 2021). To our knowledge, there are no studies focused on the use of index finger or hand pointing to express the abstract linguistic category of modality here discussed. Nevertheless, studies on Chinese and English metaphors suggest this possibility. As a matter of fact, in Chinese, the metaphors TO GUIDE OR DIRECT IS TO POINT WITH A FINGER and THE POINTING FINGER STANDS FOR GUIDANCE OR DIRECTION are linguistically manifested. That is, compounds and idioms involving zhǐ ‘finger’ express the metaphors above (among others) such as *zhǐ-shì* (finger pointing–show) ‘indicate; point out; instruct; directive; instruction; indication’, *zhǐ-dǎo* (finger pointing–guide) ‘guide; direct; supervise; advice; coach’. These abstract senses related to performative language, guiding, directing, and advising here have a bodily root (Yu, 2000). Concerning the emblematic open hand gesture shaped in various forms, these are shared across regions and recognized as the verbal message to stop (Matsumoto and Hwang, 2013).

Finally, we hypothesize that the index finger pointing can be an indexical non-deictic gesture that has a general emphasis function in the dialogue (Allwood et al., 2007), which serves to give emphasis to the speaker saying in a dialogue. This allows the expression of the obligation and the necessity of an object or event. We developed the icons shown in Figure 3. The initial idea of an officer giving orders remained. The position of the index finger is up at 45 degrees (not encoded in emoji). The next step will be to test these versions against other proposals (Figure 2 or traffic signs-based icons).

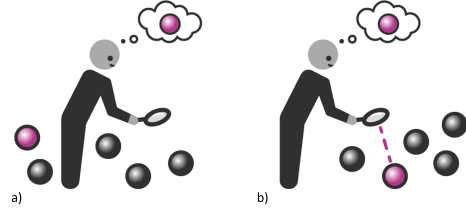


Figure 4: Icon for *to search* (a) and icon for *to find* (b).

4.2 Verbs of perception

According to Wordnet (Miller, 1998), *to find* and *to search* are perceptual verbs in the sense of becoming aware and establishing the existence of an object through the senses. These verbs are in a non-factive causal relation because *to search* MAY cause *to find* (Ježek, 2016). Searching for something has the purpose to find it even if one does not necessarily achieve the intended goal. To find indicates the result of discovering what that person is seeking. Therefore, we developed two similar icons (Figure 4). We chose to employ a magnifying glass to symbolize the process of searching and finding, following the practice of user interfaces of computers, smartphones, or websites. Payuk and Zakrimal (2020) defined the magnifying glass symbol as "finding and searching without any character or letter." It also signals the feature to zoom in and out on software or programs installed on a device (Ferreira et al., 2005). Both icons use a purple ball, which depicts an abstract object (often used in IKON) that a person is looking for or has found and that they have in mind, among other abstract objects (gray balls). This permits the distinction between *searching* and *finding*.

4.3 Verb of communication

As for words denoting communicative content, *to thank* is a verb of particular interest. There are many different ways for people all around the world to express gratitude or show appreciation to one another. Having analyzed the most widespread gestures used to thank, it was evident that there was no single gesture widespread enough to be understood across the world. For this reason, we decided to encode the cultural variation of thanking using a hyperonymic strategy shown in Figure 5. Using body language and hand gestures we depict the concept of thanking in its different cultural forms. The hyperonymic icon merges four scenarios: a person holding a hand on the chest, a common gesture for gratitude across cultures, referring to the

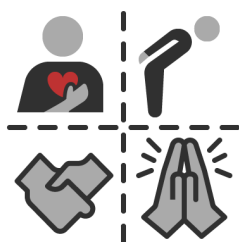


Figure 5: Hyperonymic icon for *to thank*.

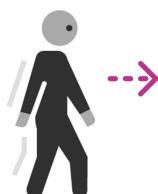


Figure 6: Icon for the motion verb *to go*.

widespread metaphorical association of the heart as a container of emotions (Gutiérrez Pérez, 2008); the formal handshake gesture; a person bowing and the hand-folded gesture, commonly used to greet and pay respect in South Asia and Southeast Asia.

4.4 Verb of motion

Wilkins and Hill (1995) define the verb *to go* as referring to a motion-away-from-the-speaker or motion-not-toward-speaker. IKON represents the verb *to go*, as shown in Figure 6, in its general meaning: a person moving toward a direction, signaled by the dashed purple arrow (following the graphic guidelines described above (Sect. 3.1.5)). (2005) described the semantics of the arrow graphic. The arrow has three slots including a tail, body, and head. If a person's image or icon is behind the tail is able to interpret that a person moves toward somewhere or someone. However, it is vice versa if it is put in the front of the head of an arrow. That should be something or someone moving toward a person.

Languages lexicalize the various types of motion in different ways. For example, Russian motion verbs differ from English or Italian in how they lexicalize direction of movement (unidirectional or in the sense of back and forth but not limited to that) and means of transportation ('go-on-foot' or 'go-by-vehicle'). Figure 6 represents the general meaning of movement toward an unknown destination. Nevertheless, we can have specific icons that encode direction, type of motion, and path.

5 Iconometer test

Iconometer is a software developed by the Univ. of Geneva (Pera et al., 1999) to implement the theoretical approach proposed by Leclercq (1992) to assess the degree of polysemy of a visual representation (icon, diagram, figurative image, photograph) and measure its adequacy to its prescribed meaning.

Iconometer was previously used within the IKON language to evaluate icons from the family domain and gender symbols used to signify gender. (Reale et al., 2021). Family icons representing family relationships with different gender signifiers were tested: only gender symbols, only haircuts, or both gender signifiers. The results demonstrated no significant difference in accuracy or certainty when comparing gender symbols, haircuts, or the combined gender signifiers. The research contributed in two ways: i) IKON language makes use of gender signifiers; ii) few family icons were subject to reconsideration due to low certainty in the test (e.g., grandfather misunderstood for stepfather).

Our current objective is to compare the level of certainty that participants had on interpretations of icons in different domains: family, modality (e.g., icons for *must* and *can*), operators, contrastive icons, motion verbs. In some cases, we proposed two or more versions of the same icon; in others, only a single version was displayed to assess how it was perceived. The new Iconometer test presents the participant with 30 visual images and no text. Below the images are 8 possible meanings and the option to write a personal answer.

The participant must distribute a total of 100 points among the different meanings according to certainty. The participant must give the most points to the meaning that seems most certain and has the option to give 100 points to a single meaning.

Currently, we have not yet a sufficient population to draw conclusions and we leave the discussion of results and consideration about the mechanism of meaning assignment for future work.

6 IKON in context: the medical domain

To get a useful set of iconic vocabulary for a typical emergency dental treatment situation, a set of questions and sentences that are important in the anamnesis and treatment of patients were developed, e.g., questions about previous illnesses of various organs, diabetes, or medication allergies. The aim was to design unique pictograms in the

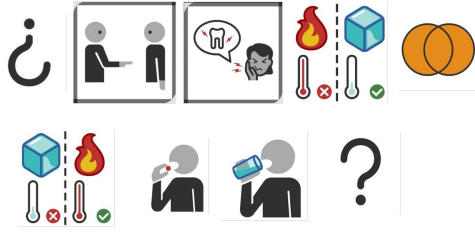


Figure 7: The iconic sentence *Do you have toothache with cold or hot food and drinks?*

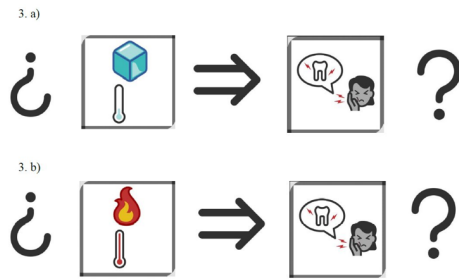


Figure 8: The simpler iconic sentence *Does cold cause your toothache? Does hot cause your toothache?*

style of IKON accomplished with the help of a graphic designer and suggestions from providers of free pictograms on the internet.

The development of intuitive content is shown using the example of the question sentence: *Do you have a toothache with hot or cold food or drinks?* (Figure 7). The concept of contrastive representation in a pictogram, like above for hot and cold, is certainly helpful in isolated observation. However, grasping this principle and paying attention to the form requires an additional cognitive effort, thus creating possibilities for misinterpretation. In this context, it seems redundant. Also, the icons for eating and drinking seem redundant and confusing.

The *and/or* sign also caused difficulties for some respondents. In light of that, it is easier to construct an iconic sentence that does not follow the syntax of questions formulated in the modern Indo-European languages of Europe. Accordingly, Figure 8 shows the same question being split into two sentences with a simplified syntax.

6.1 Online survey

An online survey with the help of Google forms was conducted to verify the thesis of simplification and to be able to make a statement about the comprehensibility of iconic sentences and signs. The subjects selected were of different age groups and cultural backgrounds. The subjects were 52: 40 Germans, 3 non-German Europeans, 4 Asians, 3

| Iconic sentences or icon | Correct answers | Rating scale (1=certain, 5=very uncertain) |
|--|-----------------|--|
| Pregnancy | 98% | 1.94 |
| The tooth is destroyed, I will remove it. | 94% | 2.1 |
| Heart | 90% | 2.54 |
| Fever | 90% | 2.25 |
| Open your mouth | 88% | 2.08 |
| Endodontic treatment | 83% | 2.43 |
| Dental filling | 81% | 2.64 |
| Are your lungs ok? | 69% | 1.94 |
| Do you take medications on a regular basis? | 69% | 2.62 |
| Do you have an allergy to medicines? | 65% | 2.51 |
| I'll give you an anesthetic, so you won't be in pain. | 63% | 2.71 |
| Diabetes | 62% | 2.82 |
| Do you have a toothache on pressure / on cold? | 60% | - |
| Dental x-ray | 54% | 2.96 |
| Where do you have toothache? | 38% | - |
| Since when you had toothache? | 38% | 2.76 |
| You have a dental abscess, I will cut/open. | 33% | 3.18 |
| Average understanding rate of individual pictograms (8x) | 81% | |
| Average understanding rate of sentences (9x) | 59% | |

Table 1: Percentages of correct answers and degree of certainty on comprehension of single icons and iconic sentences were in the survey.



Figure 9: Iconic sentence for *You have dental abscess, I will cut to get the pus out.*

Africans, 2 Mexicans. The age ranged from 15-30 years (30 subjects), 31-50 (8 subjects) and over 50 (14 subjects). The sample is unfortunately quite unbalanced as there were great difficulty in recruiting people for the survey in countries where we have no personal contacts. The original plan was to survey 20 people from each of 5 continents.

The younger group consisted mainly of university students, the older group were mostly personal contacts, who met the requirements of the study; overall, it can be assumed that the participants have an above-average level of education, although we did not collect any data on this in the survey. However, all participants spoke at least another language in addition to their native language, showing a further indicator of an above-average educational level of the test persons. Due to the small number of cases and the uneven distribution of subjects by age group and origin, the results of the survey can only be seen as a pilot study for further research. It is easier to evaluate an online survey when options have to be ticked according to the multiple-choice method. On the other hand, it is not easy to find plausible alternative meanings with complete sentences. Thus, participants had to write their solutions following a more reliable approach. This method is the opposite of the Iconometer test discussed in section 5. In terms of age, size of place of residence and use of emojis, the study showed the following trends: the group 31-50 years got the best results, no significant difference between the 15-30 and the >50 group exists; the smaller the city in which the tester live, the better the result, suggesting that the degree of graphical stimuli in bigger places does not have a significant relevance; in contrast to the intuitive thesis that users of emojis have a better comprehension rate, the frequent use of emojis as a pictorial method of communication does not lead to a better comprehension of the icons. Due to the small number of cases and the uneven distribution of the test persons in terms of age groups and origin, these results only serve as a pilot study for further research.



Figure 10: Version A and version B of the iconic sentence *Since when you have toothache?*

The answers were 69% correct, but there were great differences. Table 1 reports the percentages of correct answers for each icon or iconic sentence. Overall, single pictograms were 81% correct, while sentences were 59% correct. Single icons for *pregnancy*, *fever*, *heart*, *open the mouth* and the sentence *the tooth is broken, I will remove it* were correctly identified 90% of the time. The sentence *You have a dental abscess, so I will cut to get the pus out* had the worst result with 33% (Figure 9), perhaps due to the very specific medical treatment. The complex sentence involving time *since when you have toothache?* created difficulties (Figure 10). For this question two versions were proposed: 70% of participants preferred version B, which conveys the core elements of the meaning (e.g., pronouns had been considered confusing by participants). Only 38% answered correctly. Overall, it was read as *appointment at the dentist*.

Generally, the difference in comprehensibility rate was found much greater between the different icons and sentences than between the groups. The future task will be to work on semantic and syntactic concepts, especially in whole sentences, where the comprehension rate is still insufficient. In a clinical situation of patient-dentist discourse with a language barrier, the icons would be only part of the communication. Body language, pointing gestures, sounds, and demonstration material helps facilitate comprehension.

7 Conclusions

In this work, we presented the IKON language with a core set of about 500 core concepts. New meanings are semantically analyzed and then translated into a visual representation. In this process, IKON follows defined criteria that assure coherence and flexibility within the system while continuously

growing its vocabulary. We examined concepts grouped according to the conceptual event encoded, such as modality (e.g., *must*), perception, motion, communication verbs. These are complex events or subject to cultural variation. Their examination gave an insight into the semantic analysis required to design a visual correspondent: from the understanding of the semantic frame of a word (description of a type of event, relation, entity, participants) to semiotic and non-verbal language analysis. We then introduced modern linguistic resources that can be helpful for their depiction. However, only testing the different icons will tell us which one performs best among speakers of different backgrounds. Positively, cultural variation plays a significant role in our work, and IKON aims at giving equal representation.

We presented the Iconometer test, previously used to test the family icons and gender signifiers. The test is essential to assess the adequacy of the prescribed icons. The new test is ongoing as we do not have a sufficient diversified population yet. Therefore, we plan to analyze and discuss results in future work and review icons that do not perform well on the test.

Finally, we brought an example of the IKON language application in the dentist-patient discourse showing that medical content can be transferred successfully into an iconic language. Building iconic sentences is possible and beneficial, in that helps people with language impairment or in a situation of linguistic barrier to communicate in such a complex domain as healthcare. However, the study demonstrated that semantic considerations adopted for a single icon may not work in a more complex syntax because of the cognitive effort required.

Aknowledgments

The authors address special thanks to the graphic designers of KomunIkon for the production of the shown icons, Esteban Quiñones and Esteban Bahamonde for their support on the Iconometer software, Marwan Kilani and Linda Sanvido for their precious suggestions.

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