Human-Computer Interaction Evaluation of Shamanic Interfaces

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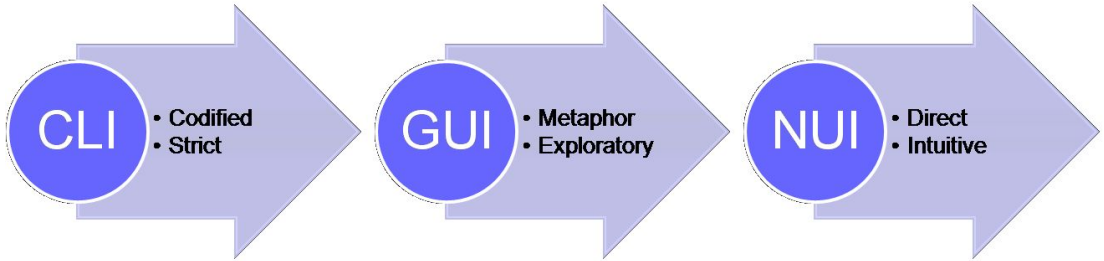
‘Natural User Interfaces’

“A natural user interface is a user interface that is effectively invisible, and remains invisible as the user continuously learns increasingly complex interactions.”



Motivation

Natural User Interfaces Are Not Natural

Donald A. Norman
Nielsen Norman Group, Northwestern University, KAIST Industrial Design | c

"I believe we will look back on 2010 as the year we expanded beyond the mouse and keyboard and started

problems of scaling up to the demands of modern complex systems, they still allow one to

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Note to Self: Stop Calling Interfaces "Natural"

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ABSTRACT
The term "natural" is employed to describe a wide range of novel interactive products and systems, ranging from gesture-based interaction to brain-computer interfaces and in marketing as well as in research. However, this terminology is problematic. It establishes an untenable dichotomy between forms of interaction that are natural and those that are not; it draws upon the positive connotations of the term and conflates the language of research with marketing lingo, often without a clear explanation of why novel interfaces can be considered natural; and it obscures the examination of the details of interaction that ought to be the concern of HCI researchers. We are primarily concerned with identifying the problem, but also propose two steps to remedy it: recognising that the terminology we employ in research has consequences, and unfolding and articulating in more detail the qualities of interfaces that we have hitherto labelled "natural".

Author Keywords
Natural user interfaces; criticism; terminology.

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

(NUI) and a verb, "natural interaction". When viewed from the point of view of interaction design, this is rather strange, given that the experiential qualities of technologies are very often hard to describe; in order to understand and design meaningful interfaces, we need all the help we can get from the words we have at our disposal. Since we in the HCI community evaluate, design, or research relations between a user and a technological setup, we must be better at reminding ourselves that we also need to develop the way that we talk about and characterize the nuances of this interaction.

In this paper, we continue the brief statement in [6] and argue that the use of terms such as "natural" is problematic because the terminology highlights qualities that it does not help us understand and explain adequately, obscuring important aspects at the same time. To frame it in the spirit of the *Critical Alternatives* conference, we will first offer a critique and then outline alternatives.

"NATURAL" USER INTERFACES
We specifically wish to criticize the way the term natural is employed to describe user interfaces—an issue that we see not only in marketing, but also in our own work and interaction with colleagues in the field. Even if [13] attempted to dismiss the term in 2010, we nevertheless see university

Gestural Interfaces: A Step Backward In Usability

One step forward, two steps back.

Once again, the usability crisis is upon us. We suspect most of you thought it was over. After all, HCI certainly understands

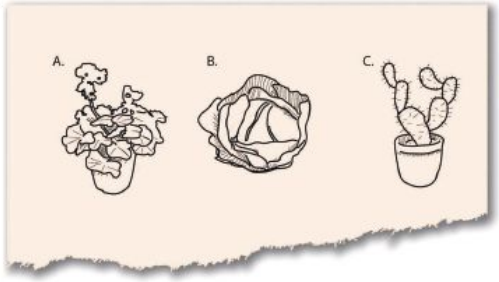
screw things up. Nielsen put it this way: "The first crop of iPad apps revived memories of Web designs from 1993, when Mosaic first introduced the image map

But the place for such experimentation is in the lab. After all, most new ideas fail, and the more radically they depart from previous best practices, the more

The Artificiality of Natural User Interfaces

Toward user-defined gestural interfaces.

CONSIDER THE QUESTION of water needs associated with the vegetation appearing in the accompanying figure: what do you think is the correct answer? Most readers are likely to answer "C." However, findings from a study conducted by Haney and Scott[3] reported there were people that chose B. Why? When they were asked to justify their supposedly wrong answer they explained that, as the cabbage is not in the pot, it means it has been picked and therefore does not need water anymore. What an example of disarming reasoning! In this case, answering B was categorized as incorrect because the test writer, who assigned the correct answer to C, did not predict it.



Which plant needs the least amount of water?

In computer science there are many cases of unexpected use of systems that were unpredictable for their designers. An example is how some users build up large databases in spreadsheet programs because they find them easier to use than regular database programs. The lesson learned

We are accustomed to interact in an environment that inhibits our innate interactive capabilities. In Nicholas Negroponte's words, our connection to computers is "sensory deprived and physically limited." The mouse is the clearest example: a de-

work with it and, despite it being simple for insiders to use, there are many people who feel disoriented by their first encounter with a mouse.

Gestural Interfaces
With gestural interfaces, we strive for

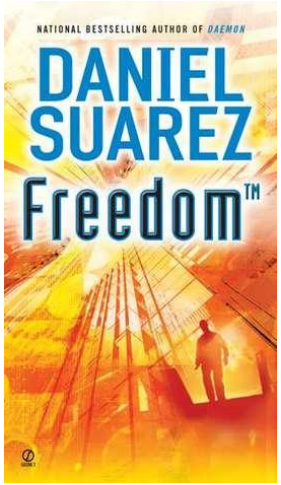
Proposal

Shamanic Interface

Name taken from a book that describes
its idealized concept:

"*It's called the shamanic interface because it was designed to be comprehensible to all people on earth, regardless of technological level or cultural background.*"

"The basic idea (...) is that the creation of a concern-separation layer between the gestures being executed by the users and their interpretation by computing systems can contribute both to the access by users with special needs and to all users in general, by enabling customized approaches to gesture-based control."



Gesture to interrupt Kinect.

Research Tool based in a Shamanic Interface

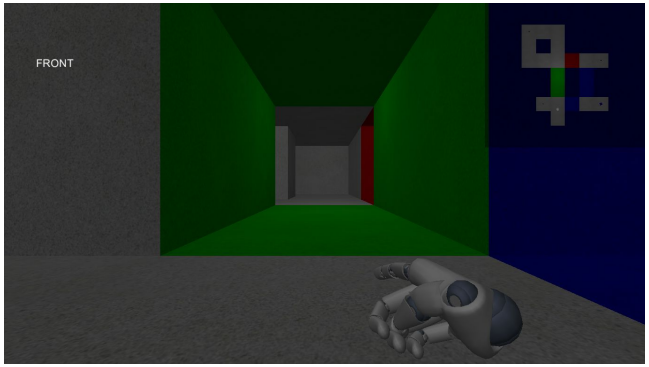
Game running on the Unity Engine.

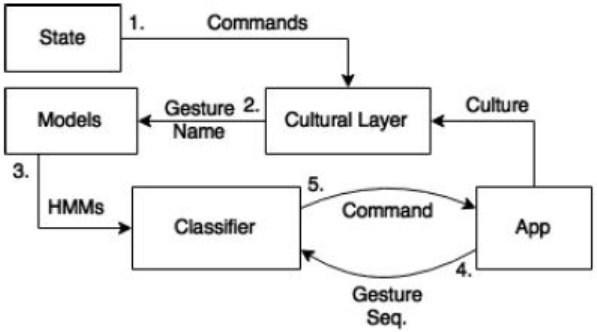
Controlled entirely through hand gestures, using a Leap Motion Device

Gestures recorded and stored as Hidden Markov Models, using the Accord.NET Framework.

The shamanic interface consist of a Cultural Layer and a Classifier Module.

Usability Testing was performed.





Objectives/Goals

Improve Tool and Provide Empirical Data and Analysis

- Focusing on user culture contributes to the learning rate, capacity and retention of commands
- Focusing on user culture contributes to the satisfaction and immersion of the experience
- A Shamanic Interface can be safely generalized without loss of coherence across contexts

Culturally Significant Human Gestures: Emblems

Locality: Common almost everywhere, but less so in Italy.

HAND WAVE (3)

Meaning: Hallo or goodbye.

Action: The hand is waved in the air but the palm is hidden from the companion. The movement of the hand is similar to the one used when embracing someone or patting them on the back.

Background: This is the 'Italian Wave' and has a different origin, being derived from the act of hugging a companion and patting them on the back. The person waving in this way is performing a 'vacuum embrace'. In ordinary usage, the movements are usually fast, but a slowed down version is employed by the Pope when waving from his balcony. He uses the wave to symbolically embrace his flock.

Locality: Italy, including Sicily and Sardinia. Outside Italian territories it is rare, but may be seen in certain special contexts, such as the British Royal Wave on ceremonial occasions.

HAND 'WRITE'

Meaning: Please bring me the bill.

Action: The hand is held up towards a waiter and then mimes the act of writing.

Table 2.1: 20 examples of Emblems, their meaning and distribution

Sign Name	Cultural Background	Meaning
Fingertip Kiss	Holland, Belgium, Yugoslavia and Turkey	Praise
	Portugal, Sardinia, Malta and Corfu	Salutation
FingerCross	England, Scandinavia, parts of Sicily, and Yugoslavia	Protection
	Corfu and Turkey	Breaking a friendship
The Nose Thumb	Everywhere	Mockery
The Hand Purse	Italy, Sardinia and Sicily	Query
	Portugal, Greece and Turkey	Good
	Belgium and France	Fear
	Holland and Germany	Emphasis
Cheek Screw	Italy, Sicily and Sardinia	Good to eat
	Germany	Crazy
Eyelid Pull	Italy	Watch out, be alert
	Everywhere else	I'm alert
Forearm Jerk	North America	Italian Salute
Flat-Hand Flick	Belgium, France, Italy and Greece	Beat it
Ring		OK
	Tunisia	Threat
	Brazil	Insult
	Germany, North Italy, Northern Sardinia and Malta	Orifice
	Belgium, France and Tunisia	Zero
Vertical Horn	Spain, Portugal and Italy	Cuckold
Horizontal Horn	Malta and Italy	Protection
Fig		Sexual comment
		Insult
Head Toss		Negation
		Beckoning
Chin Flick		Disinterest
		Negation
Cheek Stroke		Thin and ill
Thumb Up		OK
Teeth-Flick		Nothing
		Anger
Ear Touch		Effeminate
		Watch out
Nose Tap		Secrecy
		Insult
Palm-back V-sign		Victory
	Britain	Sexual insult

- CLOSE_HAND.bin
- DRINK_NL.bin
- DRINK_PT.bin
- GRAB.bin
- HALT_HAND.bin
- HAND_ROTATING.bin
- INDEX_HUSH.bin
- INDEX_ROTATING.bin
- MOUTH_MIMIC.bin
- NUM1.bin
- NUM2.bin
- NUM3.bin
- OPEN_FRONT.bin
- OPEN_HAND.bin
- OPEN_LEFT.bin
- OPEN_RIGHT.bin
- POINT_BACK.bin
- POINT_FRONT.bin
- POINT_LEFT.bin
- POINT_RIGHT.bin
- THE_RING.bin
- THUMBS_DOWN.bin
- THUMBS_UP.bin
- WAVE.bin
- WAVE_NO_THANKS.bin

Gesture Recognition and Virtual Spaces

Gesture and Modelling Approaches:

- Hidden Markov Models
- Particle Filtering and Condensation
- Finite State Machines
- Soft Computing (Artificial Neural Networks, Genetic Algorithms…)

Mixed and Virtual Reality and Input Devices:

- Unity
- Unreal Engine

- Leap Motion
- Myo Armband
- Kinect
- Virtual Reality Headsets

Field Study

Performed in a controlled environment.

First Phase:

- *Introduction*
- *Warmup* - demographic and questions for putting the user at ease as well as introduction of the tool and explanation of tasks
- *Main Session*
- *Cool off* - satisfaction survey and request
- *Closing*

Second Phase:

- *Introduction*
- *Main Session*
- *Cool off*
- *Closing*

T1.2 Evaluation paradigm

Evaluation paradigms	Field studies		
Role of users	Natural behavior.		
		Type of data	Qualitative descriptions often accompanied with sketches, scenarios, quotes, other artifacts.
Who controls	Evaluators try to develop relationships with users.		
Location	Natural environment.	Fed back into design by . . .	Descriptions that include quotes, sketches, anecdotes, and sometimes time logs.
When used	Most often used early in design to check that users' needs are being met or to assess problems or design opportunities.		
		Philosophy	May be objective observation or ethnographic.

Observing And Interviewing Users, Recording their behaviour. Writing exact answers as given. Evaluate their immersion. Identify objective and subjective evaluators. Calculate their performance.

Work Plan

(August:)	Skillset Preparation
September:	Familiarize with tools and technologies Initial Implementation
October:	Further System Implementation Model Recording Volunteer Elicitation Field Studies
November:	Field Studies, Including second phase Writing and Analyzing Results
December:	Writing and Analyzing Results
January:	Revision and Delivery

Thank You!