Thibault Raffaillac

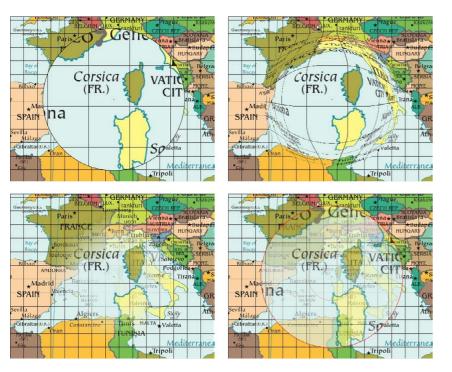
Language and System Support for Interaction

Supervised by Stéphane Huot and Stéphane Ducasse

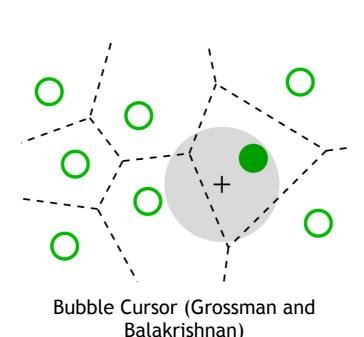




Prototyping interaction techniques



Sigma Lenses (Pietriga and Appert)





ExposeHK (Malacria et. al)

Challenging the architectures of frameworks

Requiring developers to use non-standard code

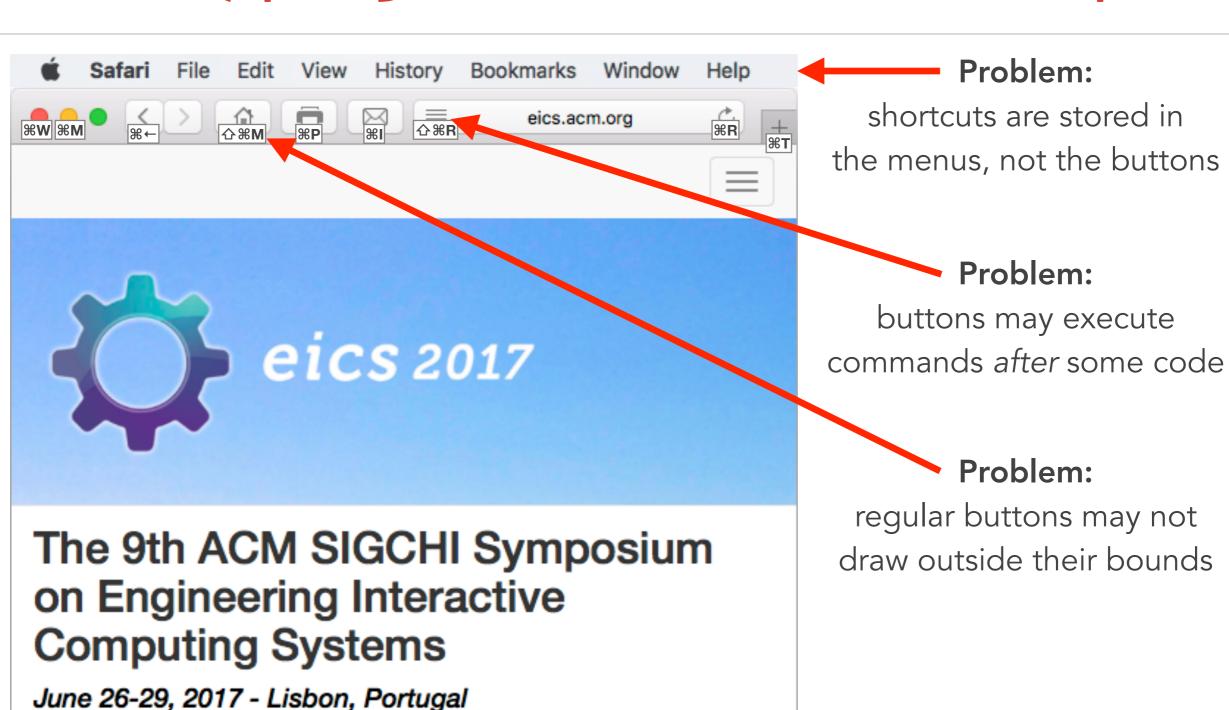
Prototyping interaction techniques





ExposeHK (Malacria et. al)

Prototyping interaction techniques



Problems

Simple interaction ideas are not simple to implement.

Frameworks describe interfaces rather than interaction.

Lack of tools to introspect and edit live interfaces.

Lack of knowledge on how users hack these systems.

Thesis context: Pharo Smalltalk

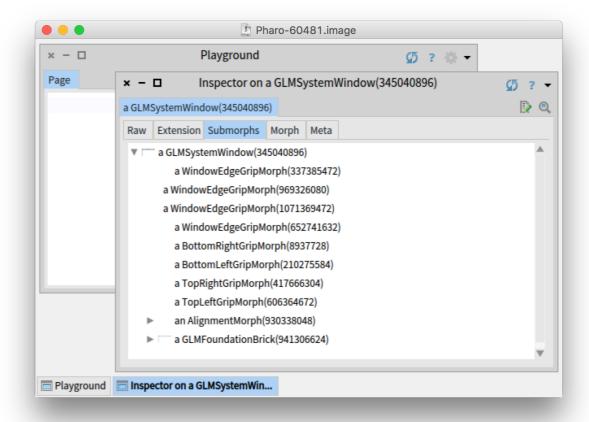
Live programming environment, pure object-oriented

Supports prototyping with introspection (inspect objects)

Ageing interface (Morphic)

Successor (Bloc) being developed *elsewhere*

Contribute indirectly



Thesis context: Pharo Smalltalk

Working on language and system below frameworks

Taking advantage of Pharo's reflectivity (access and modify language structures)

In close contact with its core developers

Framework(s)

Standard library

Interaction primitives

Programming language

Goal:

Improve the flexibility of interaction frameworks, indirectly

Plan

- 1. What can we add to languages to support interaction?
- 2. How can we make interaction a 1st class object?
- 3. What do designers of new techniques need?

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Creating language primitives

Cement and simplify established practices

Reduce frameworks' complexity

Remain consistent across applications

Evolve languages towards interactivity

Generative (unexpected uses)

Creating language primitives

```
[object property: value] during: 2 seconds
```

→ How do I validate it being "simpler"?

```
[mouse click] afterDo: [object doSomething]
```

→ What is a standard way to design this properly?

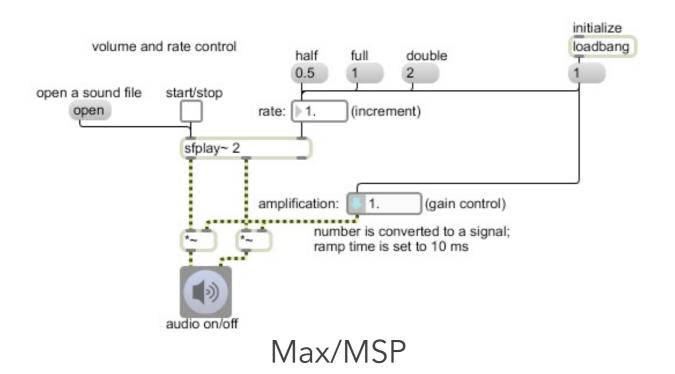
Plan

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First class objects

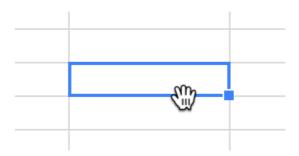
- In programming: first class citizens support common operations on variables (assignment, pass/return with function, modification)
- In HCI: open to interpretation

First class objects

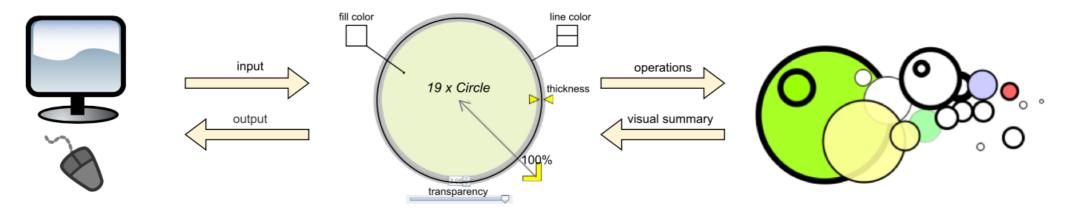




StickyLines (Ciolfi Felice et. al)



Google Spreadsheet



Surrogate Objects (Kwon et. al)

Characterizing "first-class"

Captures attention while in interaction

Revealed as normally invisible

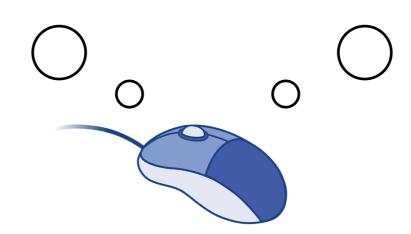
Available everywhere

Shifts the point of view to itself

Provides advanced functions

When programming interaction

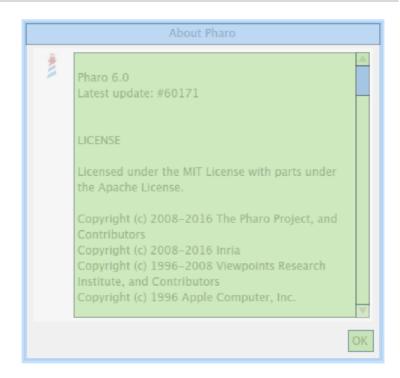
```
class Mouse {
   float dx, dy;
   bool[] buttons;
   float dpi;
};
```

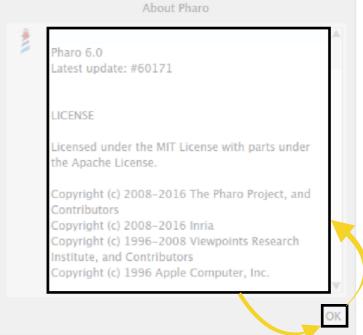


жм, жм, ж←, ...

```
class Keyboard {
  bool[] keys;
  bool[] modifiers;
  float backlight;
};
```







Plan

- 1. What can we add to languages to support interaction?
- 2. How can we make interaction a 1st class object?
- 3. What do designers of new techniques need?

Interviews

8 semi-structured interviews of researchers who prototyped advanced interaction techniques

Feb - May 2016

8h of audio recordings

Questions seeking problems encountered at every stages of their projects

Introduction This interview is part of my PhD, where I look at the limits of GUI libraries and frameworks for prototyping and building interactive applications, or advanced interaction techniques (Qt, Cocoa,	m to lost 5
Swing, SDL), and in particular how they are hacked around in actual projects, to get things done. I would like to backtrack with you a few of your past works, where the Ibrary could not do everything you intended, so you had to hack your way in. I selected some on the Internet already, but we can review another one if it is more relevant to you.	spant no. 4 Date: 22 /02/2016 May Boars Exp. Coop popular Has son Java Swing off point teath chance offen togic coop site web CHI.
Questions	ect 1 Maginting
1. Age? Years of experience? In main language? Frequency of programming? Languages/IDEs/frameworks of choice? 2. Which platform/language/IDEs/framework(s) did you use, and why these choices? Approximately how many lines of code is the project? How long did it take to code it? How many versions did you do, w.t. refactoring? 3. At which point in the design/protolyping process did you get a working software prototype? What did it implement already? What was left to implement? 4. What were your ambitions at the start of the project? Is there some of your ideas that you could not implement and test because of technological issues/limitations? 5. What was the most difficult thing you had to implement? Would you consider it hacking? What would you consider low-level there? 6. On a Likert scale (from I very dirty to 5 very clean), how "dirty" is it now? If you had the opportunity to recode it, how different would it be? 7. How did you learn the framework(s)? (official doc, book, tutorials, copy/paste examples) How much time did you dedicate to it? Did you have to learn some additional API over the course of the project? 8. With hindsight, what would have helped you best to complete the project? (excluding any library done after) A better framework? A better tutorial? 9. Now if you were to add this code to one of the libraries you used, which one would it be? (higher/lower level, new library) Why? 11. [Do you have any expectations about my work?:]	10. Ingress 2014 of Disclass High part Cet, accession his movem prinches by the military of sections transfer of central part analysis of the Military species register with a medical principalistic infections and part of the military infections and part of the military and forther military infections. As whether principalistic infections and forther military and disclass and forther military and the contract of the military and the m
Final words	
Thank you for your time! I can send you the results of this study later if you want. Also, it would be nice if we can schedule a short meeting in about two weeks, in case you have some more feedback for this study.	

Interviews

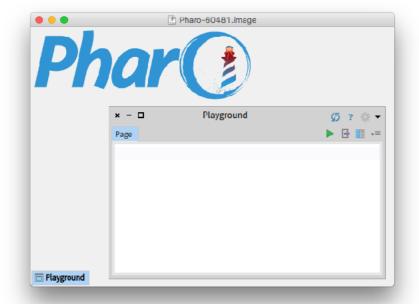
Initially could not make sense of the data (What to look for?) and gave up

After doing bibliography, committed to analyse along:

- Problems faced
- Explicit needs
- * Tools deemed useful
- Hacking strategies

Course of action

- July September: analysis of interviews
- October December: Validation of delay operator
- October April: Exploration of listener operator



[object property: value] during: 2 seconds

[mouse click] afterDo: [object doSomething]

Thank you for your attention!

Thibault Raffaillac

thibault.raffaillac@inria.fr

```
class Mouse {
  float dx, dy;
  bool[] buttons;
  float dpi;
};
```

class Keyboard {
 bool[] keys;
 bool[] modifiers;
 float backlight;
};



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