Advanced Design and Evaluation of Interactive Systems

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ExSitu lab, Inria & Univ. Paris-Sud
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For Tuesday: (afternoon session)

Each group should have:
- questionnaire results
  - 5 questions per group questionnaire
  - ~20-30 responses (if each person sends to 10 friends)
- 4-6 introspection stories from class
- 4-6 new interviews

Design process:

Based on your data:
- identify a specific challenge with sharing songs or videos (no solution yet!
- specify the user profile
- create 3 personas (1 extreme) from your data

Define at least 8 interaction points
- create a user scenario with 6-8 interaction points

Figure out a design that will address the problem
- design concept (first draft)

Reminders:

User profile
- Who is the target user?
- What tasks do they perform, under what circumstances?
- What specific problems do they face?

Personas and extreme characters
- Imaginary (but grounded) characters

Interaction points
- Fundamental units of interaction

Design concept
- Key design idea

Lecture topics

Instrumental Interaction
- Reification
- Polymorphism
- Reuse

Reciprocal Co-adaptation
- Feedforward & Feedback
- User Appropriation

Substrates

Exercises

Generate principled design
Create design scenario
with interaction points
Create storyboard

Instrumental interaction

Instrumental interaction

Beaudouin-Lafon 97

Inspiration
Interaction with our environment
is mediated by tools and instruments

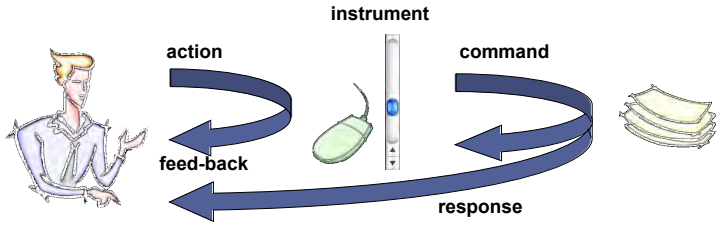
Two categories of objects

Domain objects

Interaction instruments

Interaction instruments

Conceptual model



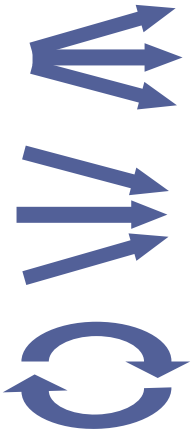
Two levels of interaction: mediation

Generative power : Three design principles

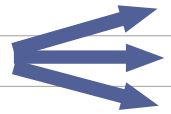
Reification
extends the notion of
what constitutes an object

Polymorphism
extends the power of commands
with respect to these objects

Reuse
provides a way of capturing and
reusing interaction patterns



Reification



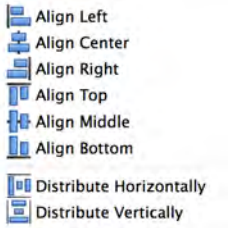
Turns concepts into (interface) objects

Interaction instrument
Reification of a command into an interface widget

Example :
scrolling a document -> scrollbar

Examples
Guidelines: reification of alignment
Layers: reification of mode

Example: Alignment command



Magnetic guidelines

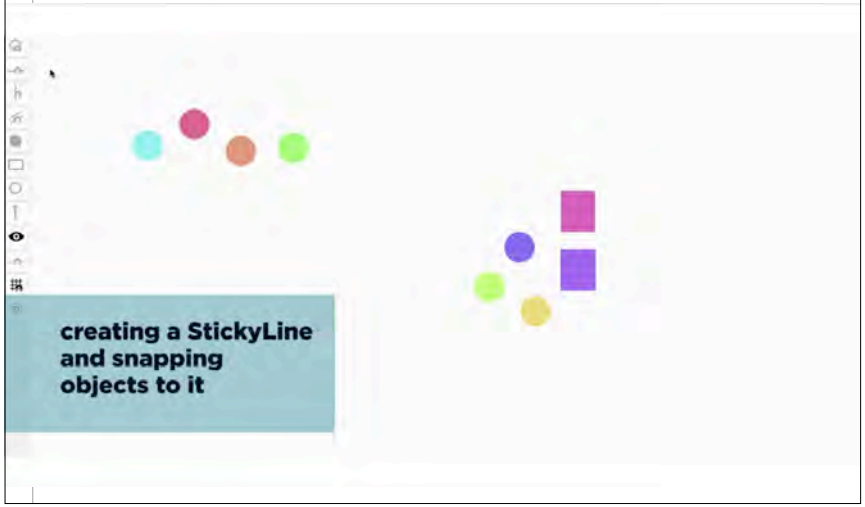
Reification of the alignment command

Power and simplicity
Align command vs Align object:
Align (now) vs Align (and keep aligned)

Multiple shapes
Horizontal, vertical, diagonal, circular, rectangular
Distribute objects

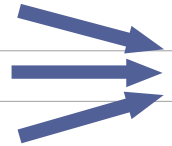
Decomposition
Create / Move / Add object / Remove object

StickyLines prototype



13

Polymorphism



Extends commands to multiple object types

Common examples:

- Cut, paste, delete, move

Context-dependent commands

Homogenous groups

- If applicable to one object, then applicable to a group of same-type objects

Heterogeneous groups

- Applicable to a heterogeneous group if it has meaning for individual object types

14

Reuse

Captures interaction patterns for later reuse

Output reuse

- Reuse previously created objects
- Example: duplicate, copy/paste

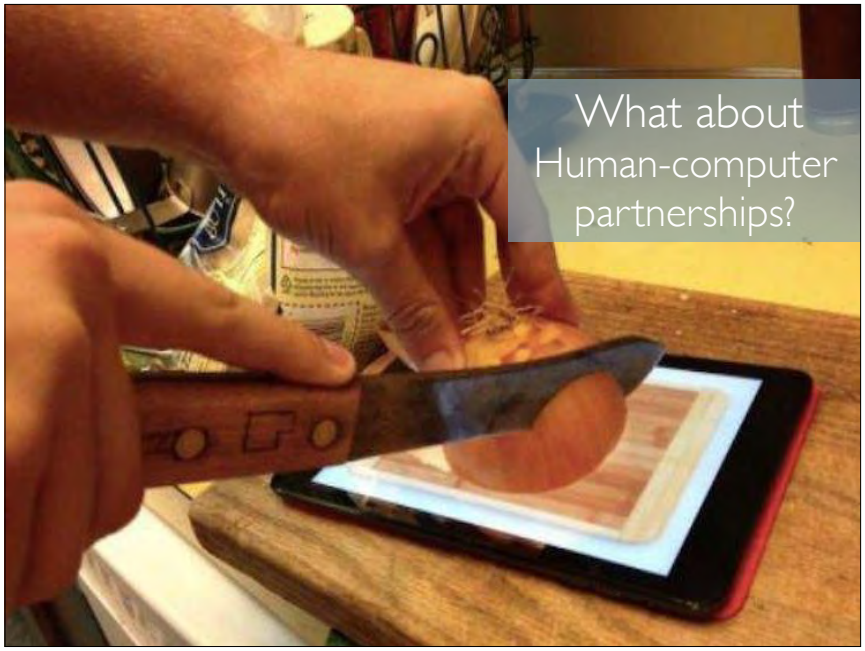
Input reuse

- Reuse previous commands
- Example: redo, history, macros

15

Co-Adaptation

16



17

How do we interact with computers ?

Computer as ***tool***
Empower users

Human-Computer Interaction

Computer as ***servant***
Delegate tasks

Artificial Intelligence

Computer as ***medium***
Communicate

Mediated Communication

18

What do we mean by 'partnership' ?

Take a taxi
Driver in control

19

What do we mean by 'partnership' ?

Take a taxi
Driver in control

Drive a motorcycle
User in control

20

What do we mean by 'partnership' ?

Take a taxi
Driver in control

Drive a motorcycle
User in control

Ride a horse
Shared control

21

We can use physical tools as designed…

22

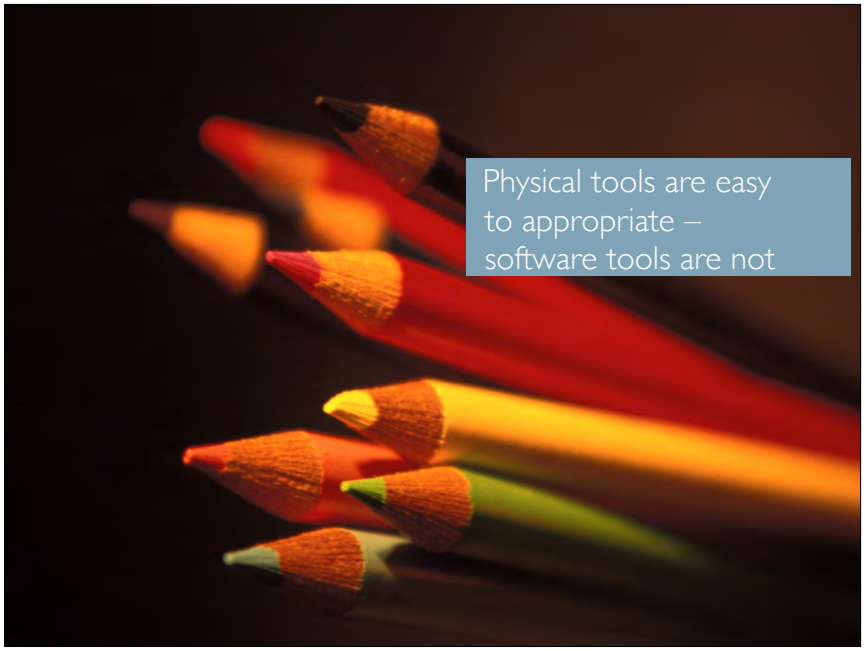
We can use physical tools as designed…
but we can also misuse and improvise

23

Instrumental interaction

But I should also be able to choose
my favorite hammer !

24



25

26

If we can appropriate physical tools
… why not software?

27

Human-Computer partnerships

- People
  - adapt to technology – they learn it
  - adapt the technology – they appropriate it
- Computers should
  - adapt to people – they learn (AI)
  - adapt people's behavior – they teach

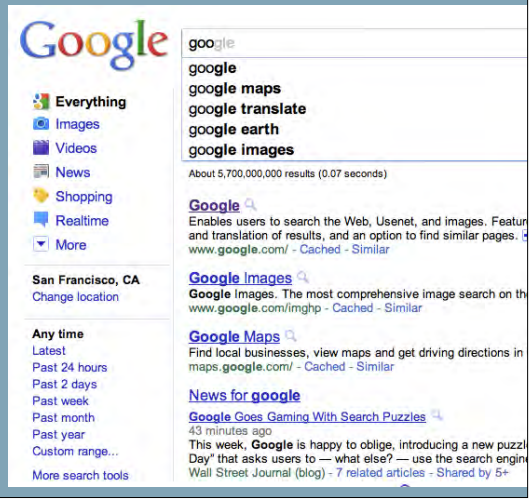
28

A simple human-computer partnership

User types …

Google suggests …

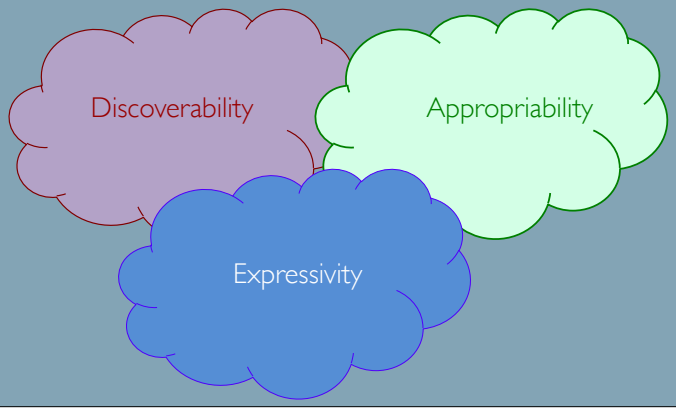
User chooses



29

30

Human-Computer Partnerships require:



31

Complex gestures on a smartphone

Rapid	*but*	hard to learn
Eyes-free		hard to remember
Large vocabulary		

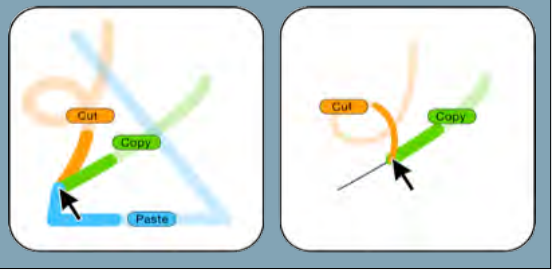
32

Octopocus: Learn gesture-based commands

UIST'08

Progressive feedforward
what gestures are available?

Progressive feedback
what did the system recognize?

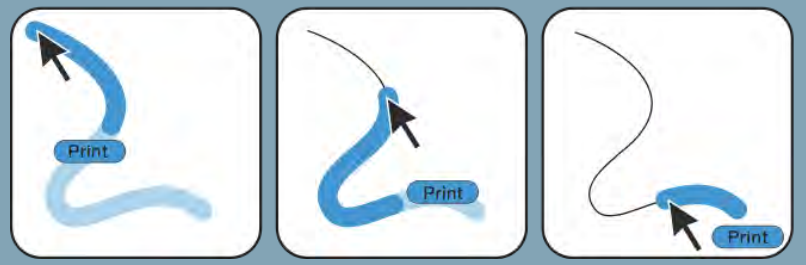


33

Dynamic partnership between user and system

Experts just perform the gesture

Novices hesitate and the guide appears



34

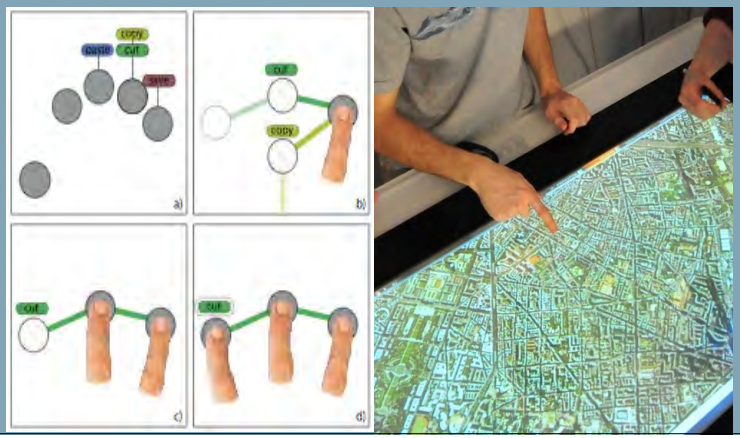
Inking the '*Help*' command

35

ITS'14

Arpege: Learning chord commands

Beyond one- and two-finger gestures

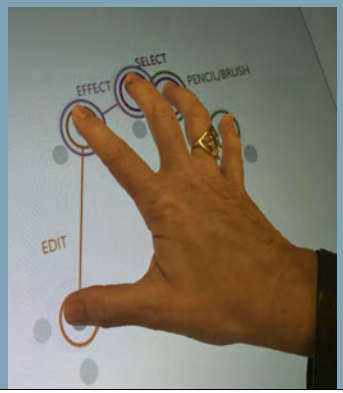


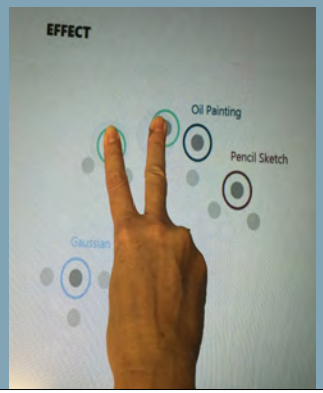
36

Dynachord: Hierarchical, dynamic chords

Chord sequences for a larger chord vocabulary

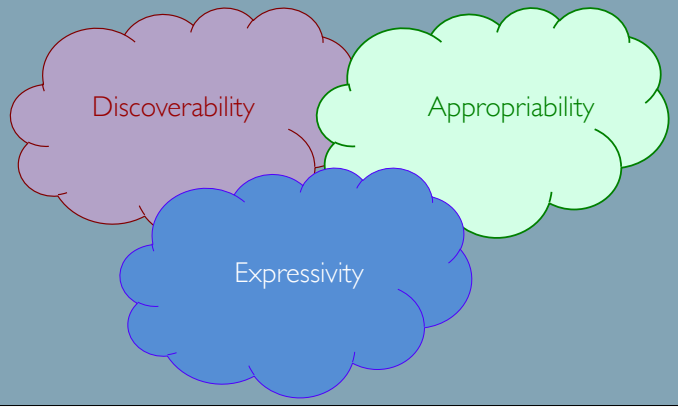
Dynamic parameter adjustment





37

Human-Computer Partnerships



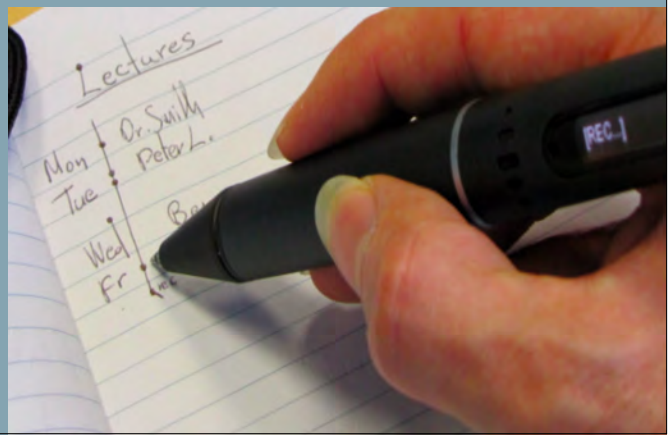
38

Knotty Gestures: Draw a dot, define a command

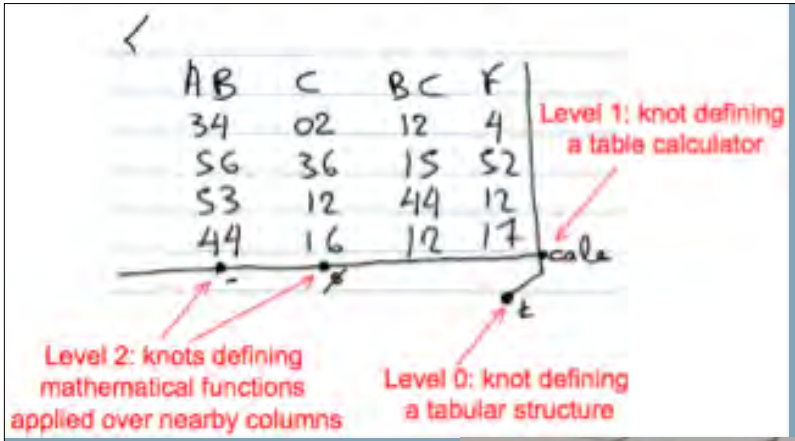
AVI'10

Interact while writing

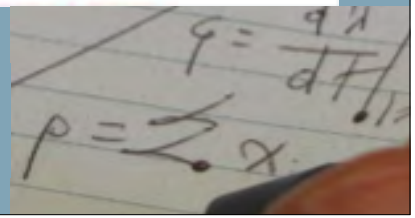
Interact with commands later



39

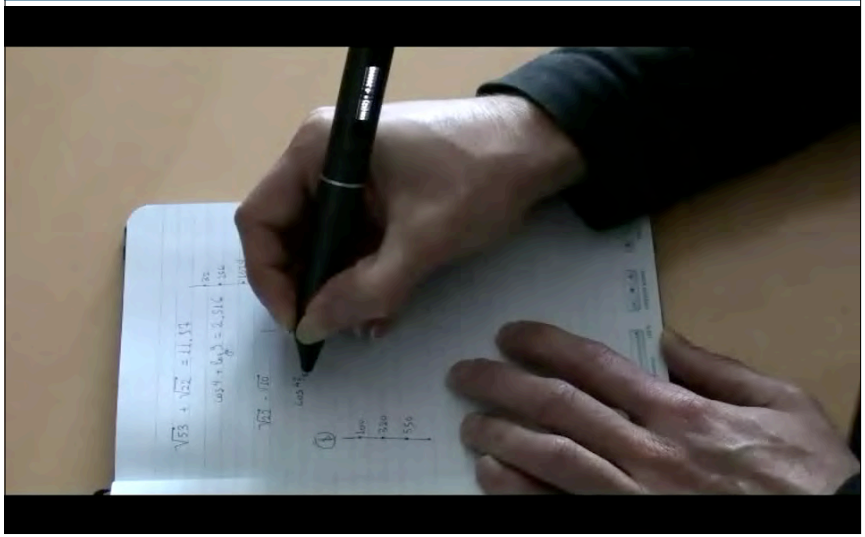


Knots can define mathematical relationships



40

Knotty Gestures

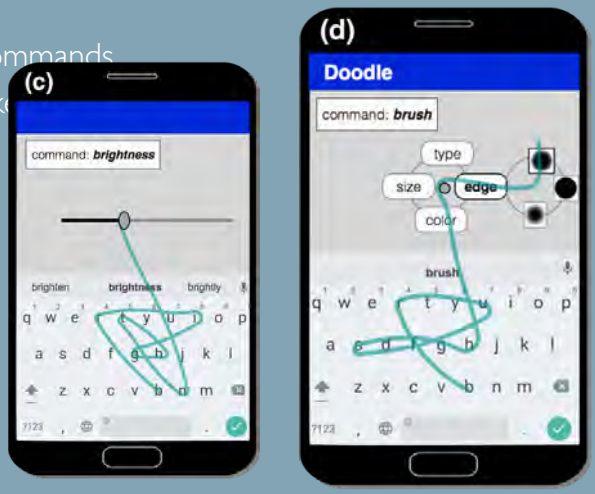


41

Command Board

2017

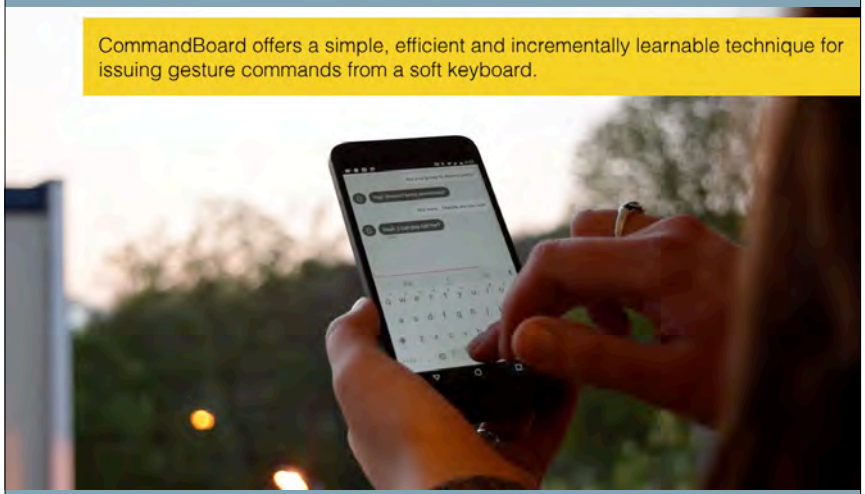
Generate commands
from a soft k



42

CommandBoard

CommandBoard offers a simple, efficient and incrementally learnable technique for issuing gesture commands from a soft keyboard.



43

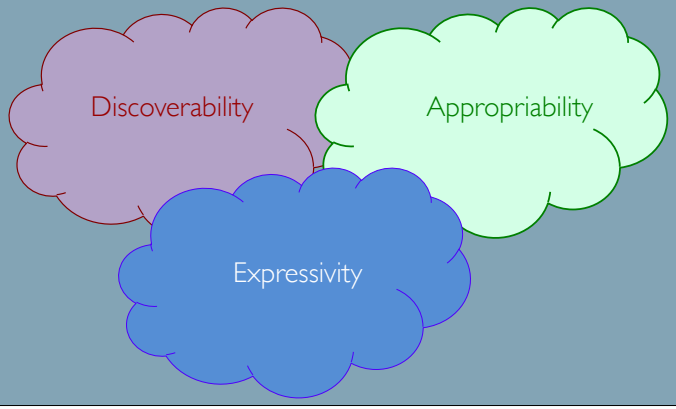
Pathward & Fieldward

CHI '17

Progressive feedforward lets users create personal,
easy-to-*remember* gesture-command pairs
that the system can *recognize*

44

Human-Computer Partnerships



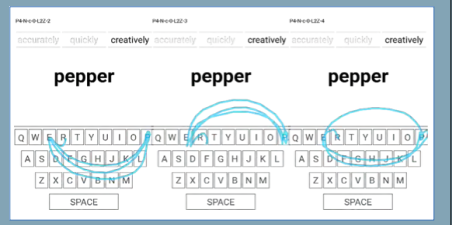
45

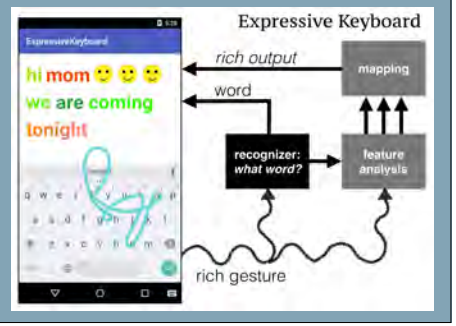
Expressive Keyboard

CHI'17

Gesture typing focuses on finding a *correct* word

Expressive keyboard lets users use gesture variation to generate and control expressive output

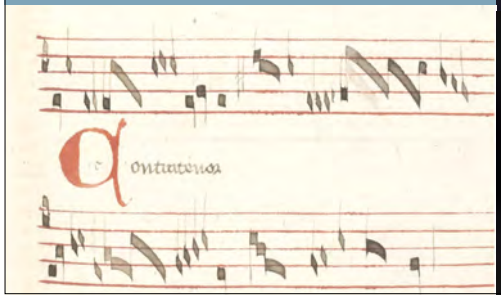


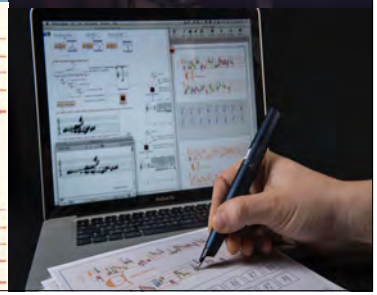


46

Quid Sit Musicus
Philippe Leroux

13th century musical scores
Each note indicates expression





47

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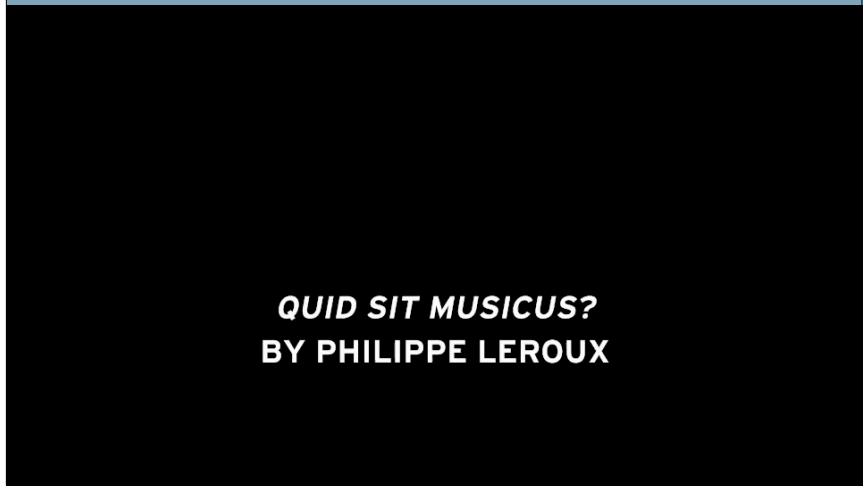
Philippe Leroux



48

Substrates

49

Substrates

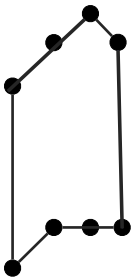
Where do objects live?
How do instruments know their properties?

Substrates capture data types and data relationships
Excel spreadsheet: complex structure

50

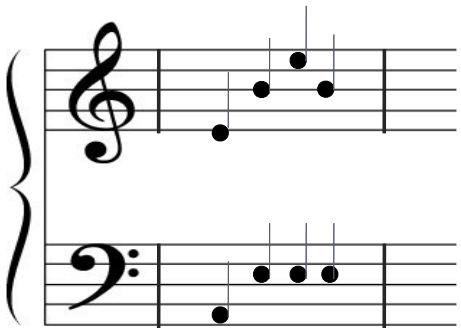
How do we interpret data that users generate?

51



Base for the travelling salesman problem?

52

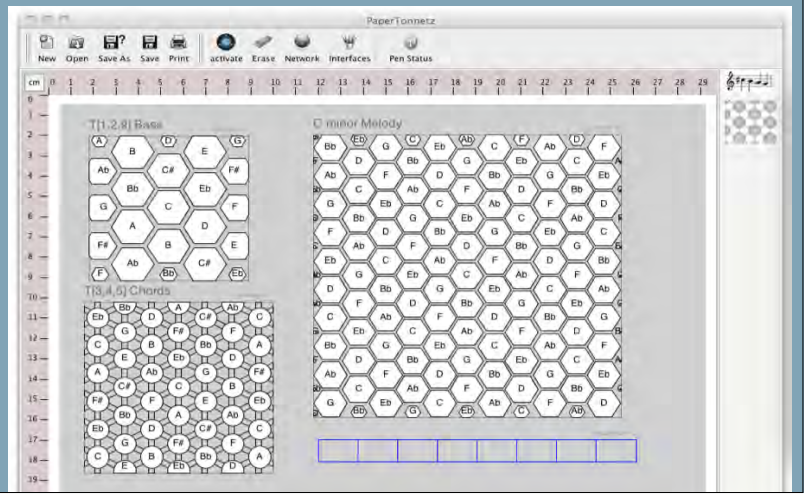


Or perhaps a piece of music …

Structured environments facilitate interpretation

53

PaperTonnetz
'Draw music' with gestures



54

PaperTonnetz

Supporting Music Composition with Interactive Paper

Jérémie Garcia, Louis Bigo, Antoine Spicher and Wendy E. Mackay

INRIA, IRCAM, LACL

55

What to do next

You should have:
- Problem to solve
- User profile and 3 personas (one extreme)
- 6-8 interaction points

Create a design concept

Then:
- use scenario
- design scenario
- storyboard

56