Next-Generation
Spoken Language Interfaces
Evolution or Revolution
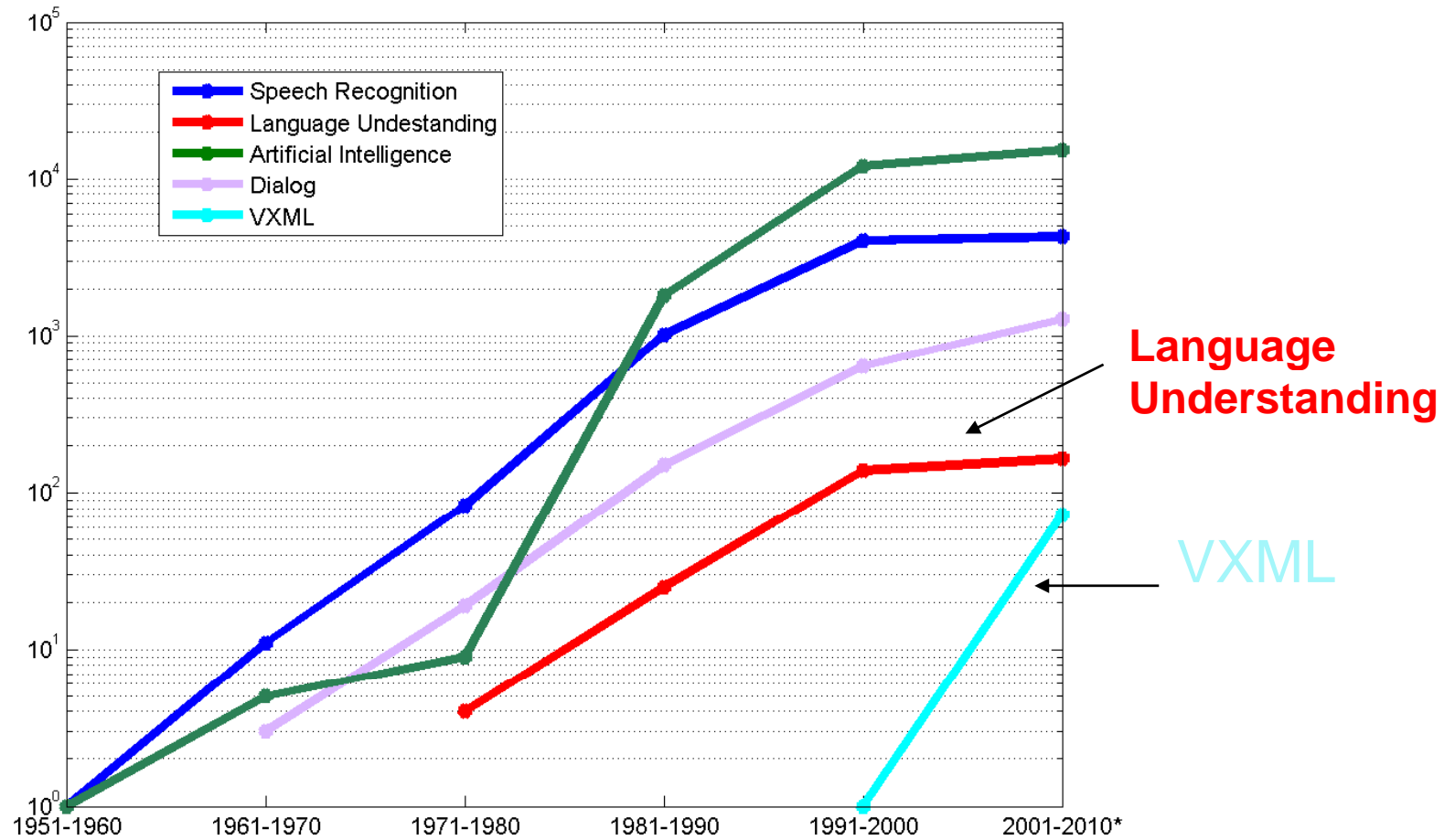
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Research Trends

(source IEEE, 2007)

Human-Machine *vs* Human-Human

Form Filling (H-M)
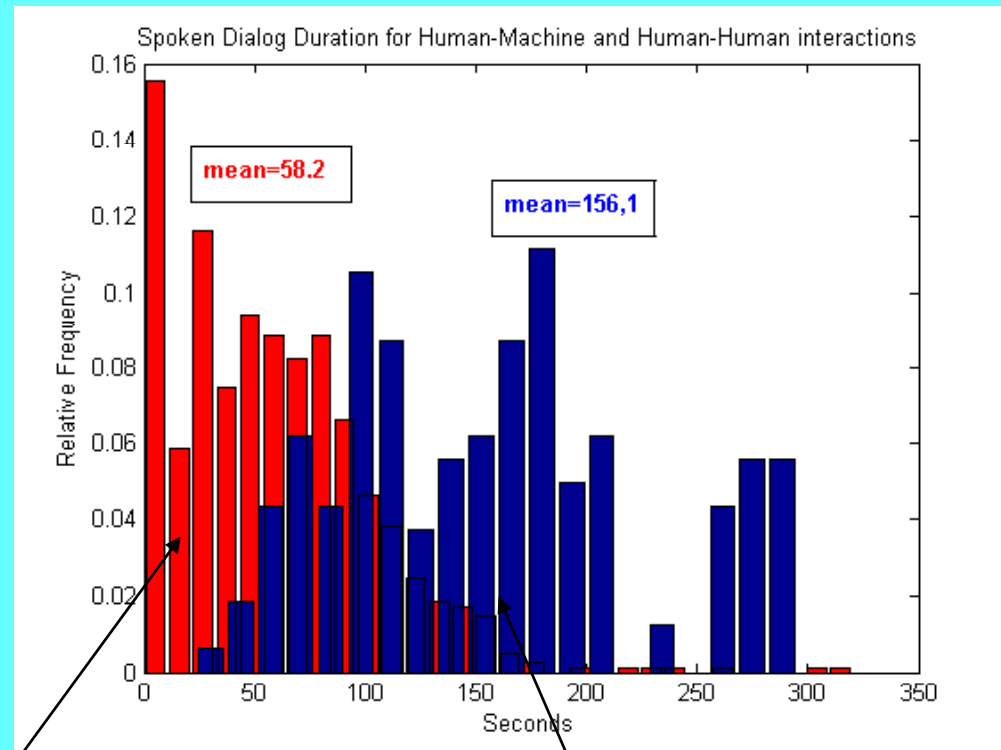
SLU
  Attribute/Value Pairs (<6)

Knowledge
  Database backend

Dialog
  Task = Known
  Goal = Slot Filling
  Control = Mixed Initiative

Spoken Dialog Duration for Human-Machine and Human-Human interactions

mean=58.2

mean=156,1

University Help Desk, 07

Technical Help Desk, 07

Human-Machine *vs* Human-Human

Spoken Dialog Duration for Human-Machine and Human-Human interactions

mean=58.2

mean=156,1
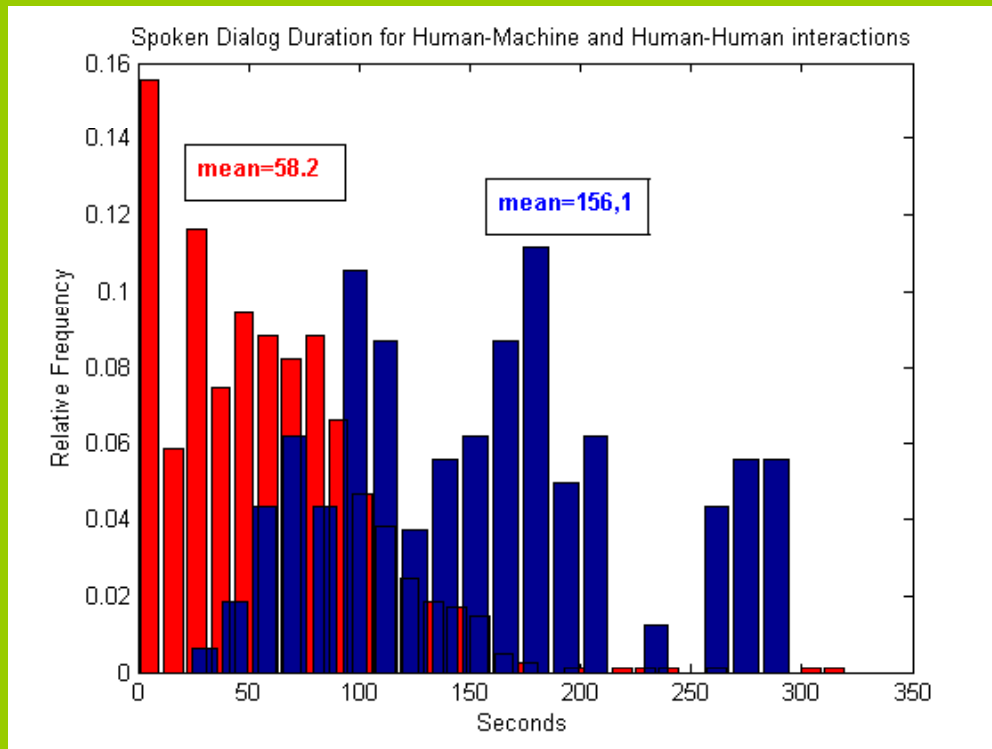
Problem Solving (H-H)

SLU

Attribute/Value Pairs (>>6)

(Shallow) Semantics: Predicate/Argument

Situated : Time and Space

Knowledge

Database backend

(h)Ontology

Dialog

Task= Not Known (Very Large Set)

Goal= Problem Indentification

Problem Resolution

Control = Cooperative

Problem-Solving Dialog

IT Help Desk

U Hi Good Morning

O Hi, How May I Help You?

U I am Roberta Sicconi calling from Cultural Affairs at City Hall.

Personal Identification

U I had made a request for a password change yesterday

O Ok do you have the request track id?

U Uhm No I cannot find

O Ok do you have the date of the request?

U Well that was yesterday

O ...ok I think I can find it..I got it

O It's for a password reset.

Problem Statement Ticket Record Retrieval

U Right. The problem is that I changed the password when I first logged in..

Problem Resolution (USER)

O You were supposed to change first time you logged in. Now let's try together to log in

O can you tell me you RVS of your computer

U Well let me see. This is a new PC to me. Where can I find it?

O Usually the tag is right next to the base of the chassy next to the power switch. It reads "inventario settore informatico".

U Inventario..Settore... Informatico. Got it 123456

Problem Resolution (PART I) OPERATOR asks help to the USER to connect to his PC

O yes that is right. Now, you see I'm writing the old login..now you type in the new login. It should be at least 6 characters...

U Ok let me write that down one moment

....

Problem Resolution (PART II) OPERATOR and USER work together to fix the problem

Predicate-Argument Structure
(example)

[Operator] : you said you [couldn't]$_{fe1}$ [access]$_{fe2}$ [the computer]$_{fe3}$ and you [are missing]$_{fe4}$ [the login procedure]$_{fe5}$

frame : access
   frame-elements : {user, hardware}
     fe id:fe1 f-element: negation
     fe id:fe2 f-element: target
     fe id:fe3 f-element: hardware
frame : need
   frame-elements : {user, requirement}
     fe id:fe4 f-element: target
     fe id:fe5 f-element: requirement

Coreference

[Operator] you said you couldn't access [the computer]$_{c1}$
and you are missing [the login procedure]$_{c2}$
  Coref id: c1 info-status:given ...
  Coref id: c2 info-status:given ...

[User] right

[Operator] I will need [the RWS]$_{c3}$ [of the PC]$_{c4}$
  Coref id:c3, info-status: new, related:yes,
      related-phrase:c1, relation: rwsOf
  Coref id:c4, inf_status: given, single-phrase-
      antecedent:c1

[User] yes that is [thirteen zero eightysix]$_{c5}$
  Coref id:5, info-status: new, related:yes
      related-phrase: c3 relation: instanceOf

Cognitive Interfaces

- Cognitive SLU
  - Cognitive loads shift
  - Attention
  - Memory (Long tasks)
- Applications
  - Problem Solving (e.g IT Help-Desk, In-Field Technical Assistance)
  - In-Car conversational interfaces