L’Intelligence Artificielle Sonne-t-elle le Glas de l’Interaction Sociale ?

• Justine Cassell
• Carnegie Mellon University

Humain et Numérique en Interaction
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Espoirs vis-à-vis la nouvelle technologie

Bienfaits de la télé pour vos enfants
—“My child has murder on the mind. It’s because of those horrible [things]. I know it is!”

1949 ("thing" = radio)

—“There are a few things to practice not doing. Do not be afraid of [it]. These things are probably here to stay. Do not be afraid of your child. He is not here to stay. He is a precious visitor. Do not wind your child up and set him to [play with it] unguided. Do not wind [it] up and set it to watch your child. A machine is a bad sole companion. It needs help. You can help it. Love your child.”

1962 ("it" = television)
A father followed his daughter to an assignation with a man whom his daughter had met online, and threatened to blow her brains out. She had him arrested and charged with threatening behavior.

The girl, Maggie McCutcheon, helped her father run a newspaper-stand in Brooklyn. Maggie's father had decided to get a **telegraph** to help him process electronic orders. Due to his lack of technical skill, Mr. McCutcheon asked Maggie to operate the thing, but soon found out she was using it to flirt with a number of men, particularly one married man she had met on-line. She ultimately invited “Frank” to visit her in the real world. McCutcheon found out and forbade his daughter to meet up with the man. But Maggie nevertheless continued to meet him in secret.

**1886 Electrical World**

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1. Deeper understanding of how people play, work, learn – using language and non-verbal behavior, in close interaction and collaboration with others, through the use of social science and AI tools.

2. Deeper ability to design technologies that support human playing, working, learning, with and through technology.

3. Push field of AI to replace “autonomy” with “interdependence”

4. Push Computer Science to not think of human behavior as “soft”
L’IA Comme Outil pour Comprendre le Comportement Humain
Children who studied with bi-dialectal (African-American Vernacular English and Mainstream Classroom English) virtual peer showed more gains in science discourse than those who worked with mono-dialectal virtual peer (Mainstream Classroom English only).

However, result was mediated by rapport – students were more likely to feel rapport with bi-dialectal agent, and students whose videos were independently rated as showing more rapport were more likely to show gains in science discourse.

Work with Samantha Finkelstein
Rapport (Entente) améliore la performance sur les tâches

**Surveys**
Survey respondents gave higher quality answers if they felt rapport with interviewer (Berg (1989))

**Health**
Physicians who build rapport during trial interviews enroll more participants (Albrecht et al., 1999).

**Sales**
Rapport with sales staff leads to increased likelihood of purchasing goods/service (Brooks, 1989).

**Education**
Students learn better when they feel rapport with their peers (Azmitia and Montgomery, 1993; Sinha and Cassell, 2015; Madaio, Ogan, Cassell, 2017)
L’IA comme Outil Pour améliorer les interactions Humain - Numérique
(OU: Pourquoi des Ordinateurs Conscients de nos Réflexes Sociaux ?)

1. People pursue multiple conversational goals in every conversation & expect the same from their interlocutors. I hypothesize that if our computer partners understand the propositional, interactional and interpersonal functions of conversation, it will increase trust and rapport which, in turn will improve performance.

2. People change interaction styles over time. I hypothesize that increased performance will result if our computer partners manage long-term interactions with people by changing interaction style in a way that indicates the system’s increased rapport and trust.
Recueillir des données

Théoriser & Modéliser

Etudier

Implémente des modèles formels

Tester

Se rendre compte des lacunes!

Créer

Implementer système sur la base des modèles

Evaluer

Commencer ici
Observer

Work with Michael Madaio
Analysis of verbal and nonverbal behavior at 1/30 of a second granularity

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L’exploration de données: 
à la recherche de séquences productives
(High-utility Sequence Mining Peer Learning)

Sequence Rapport: 5
{Tutee_State_Procedure, Tutor_Give_Feedback, ...}

30-second Video Slices

Work with Zhen Bai, Bhargavi Paranjape, Tanmay Sinha
Apprentissage de règles d’Association temporelles : des Amis

Example: Friend in high rapport

- **Tutor:** Sweeney you can't do that, that's the whole point *{smile} [Violation of Social Norm]*
- **Tuttee:** I hate you. I'll probably never never do that *{Reciprocate Social Norm Violation}*
- **Tutor:** Sweeney that's why I'm tutoring you *{smile}*
- **Tuttee:** You're so oh my gosh *{smile}. We never did that ever [Violation of Social Norm]*
- **Tutor:** *{smile} What'd you say?*

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MODÈLE ISSU D’ANALYSE DE DONNÉES ET DE LA THEORIE: GESTION DU RAPPORT

Rapport Enhancement
- Mutual Attentivness
  - Maintain attention to others

Rapport Maintenance
- Face Management
  - Support & Appreciate other’s “true-self”
- Coordination
  - Enhance other’s positive face
  - Act predictably
  - “Index Commonality

Strategy
- Initiate mutual self-disclosure
- Refer to shared experience
- Disclose topic-related intimate personal information
- Reciprocal Appreciation
- Embarrassed Laughter
- Praise
- Negative Self-disclosure
- Acknowledge
- Adhere to sociocultural or interpersonal norm (including relational definition)
- Reciprocate previous action (ex. Respond to other’s self-disclosure)
- Violate sociocultural norm to match interpersonal norm

With Ran Zhao

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Modèle des Processus de Gestion de Rapport

Rapport building

Rapport

Friends
- Violate sociocultural norms to fit interlocutor’s behavior expectation
- Mark in- and out-group
- Learn behavior expectations

Shared personal knowledge gap

Strangers
- Politeness according to sociocultural norms
- Learn behavior expectations

Rapport

Reasoning

Shared personal knowledge

Self-disclosure

condition

Reciprocity

Process

Goal

Norm Recip.

Conv.
Norm

Attributed Process

Estimate

Appropriate social distance at right time

Generate

Imagined interaction:
- Min. vulnerability
- Influence subs. attr. process

Rel. def. (soc. ID)

Match “likeness” and rel. stage (T1/T2)

Relationship Stage (T1/T2)

Social Norm

Conv.
Norm

Attributed Process

Reciproc

Strategies

Discloser

Trust

Positive Face Enhancement Signal

Goal of Relationship Development

Index “True self”

Social Validation

Social Control

Recipient

Small talk, gossip, …
Implementer

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Implementation d’Architecture Informatique: Agent Sensible aux Comportements Sociaux

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Tutoring Session

-9 + 10x = 41

10x = 32

ADD STEP
Comment Évaluer la Performance du Système

**Interaction**
- Total Time
- System Speaking Time
- User Speaking Time
- System’s Response Time
- User’s Response Time
- System’s Interruptions
- User’s Interruptions

**Verbal**
- System’s Intentions
- User’s Intentions
- System’s Conversational Strategies
- User’s Conversational Strategies

**Task**
- Session Rec. Acceptance Rate
- Person Rec. Acceptance Rate

**Interpersonal**
- Thin Slice Rapport Score
- Mutual Attentiveness
- Coordination
- Positivity

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Curiosity is “a desire to know, to see, or to experience that motivates exploratory behavior dedicated towards the acquisition of new information” (Litman, 2005)

It is an important predictor of academic performance, and a key character quality of 21st century skill (Stumm, et al. 2011, New Vision for Education, 2016)

“Children are born scientists. From the first ball they send flying to the ant they watch carry a crumb, children use science's tools - enthusiasm, hypotheses, tests, conclusions - to uncover the world's mysteries. But somehow students seem to lose what once came naturally.” (Parvanno, 1990)

But curiosity is being systematically squelched by a teach-to-the test environment, and test-score dependent funding.
Phénomène Encore Peu Etudié

Curiosity in the Social Context?
“Children learn by talking and working together”
(Cohen & Lotan, 2014)

I wonder if I move this higher, will the ball get enough momentum
I’m actually thinking of the same thing
Or…Maybe we can make the ramp longer
I don’t think it’s going to work. Trust me I’m good at it.

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Comment Recueillir les Données

Groups of 3-4 children building a Rube Goldberg Machine were videotaped with cameras from every angle.

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Resultats Préliminaire: Comportements Indiquant Curiosité

Continuous time Structural Equation Modeling factor analysis pilot results. Direction and degree of predictive influences are represented by edges between multimodal behaviors and latent variables.
Temporal Dynamic: Rapid increase and decrease of curiosity mined using anomaly detection, measured as the deviation of curiosity from windowed average.

Social Dynamic: Convergence of curiosity by three or more group members, measured as low standard deviation in group’s curiosity.
Resultats Préliminaires:
Sequences de comportements qui évoquent la Curiosité

Rapid Increase in Individual Curiosity (O – Other, T – Target)

O’s Idea Verbalization ➔ O’s Justification ➔ O’s Negative Evaluation
O’s Negative Evaluation & Justification ➔ O’s Idea Verbalization ➔ O’s Confusion
O’s Agreement ➔ O’s Idea Verbalization, Justification ➔ T’s Confusion
O’s Idea Verbalization & Justification ➔ O’s Negative Evaluation ➔ O’s Question Asking

O’s Idea Verbalization and Justification ➔ T’s Justification ➔ O’s Arguments
T’s Idea Verbalization and Justification ➔ T’s Justification ➔ O’s Arguments

• Other argues with target child’s idea verbalization and justification
Example: Behavior Dynamic across Individuals that led to Curiosity Increase

P1: I mean, it would be strong enough, but how would the ball roll up again?

P2: Oh! No, these wouldn't be strong enough

P3: I have an idea! We could use two of these. If we had a hard enough dip, the ball would come down

P1’s Idea Verbalization and Justification ➔ P2’s Negative Evaluation ➔ P3’s Curiosity Increase
How Rules are Embedded in Virtual Peer: Curiosity-Evoking Virtual Peer Computer Architecture
Implementation
Interface Pour Enfants Autistes
Virtual Peers: Interlocuteurs virtuels : autant partenaires que marionnettes

Children with ASD demonstrate more narrative and interactional skills with virtual peer
Contrôler les interlocuteurs virtuels pour Comprendre les Comportements Interpersonnelles
Revision des Panneaux

First try

Second try

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Resultats

*Design:* The very use of the panel was diagnostic of behaviors that may be affecting reciprocity:

— [Begin conversation button] “Wanna hear a scary story? Well if you said yes, that’s good. If you said no than too bad, cause I’m about to tell one. One day...” <continues on with the story>.

*Design:* The use of the panel resulted in monitoring and revising:

— “I should have used more question buttons. Can I try it again”

*Intervention:* The use of the panel resulted in transfer effects to child-child role play in the use of reciprocity:

— significant effect due to use of the AVP (F ratio = 11.48; p<0.002), with a higher rate of appropriate responses predicted if the child first interacted with the AVP. Especially affected were “give feedback” and “respond”

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Donc:

• Social AI allows us to better understand social interaction.

• Social AI allows us to continue to act human, in an increasingly technological world.

• We are creating AI that evokes social behavior.
For more information
http://www.cs.cmu.edu/~justine/
http://articulab.hcii.cs.cmu.edu/

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