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Linguística Computacional Interativa

Projeto SGD-Br e pesquisas relacionadas

Aula de 21 de Agosto de 2012



- **Geral do SGD-Br**
 - O que é raciocínio computacional
 - Por que é importante aprender
- **Sobre o AgentSheets**
- **Nossas pesquisas**
- **PoliFacets**





Projeto Scalable Game Design Brasil (SGD-Br)

Clique para a Computação



ADDLabs / UFF

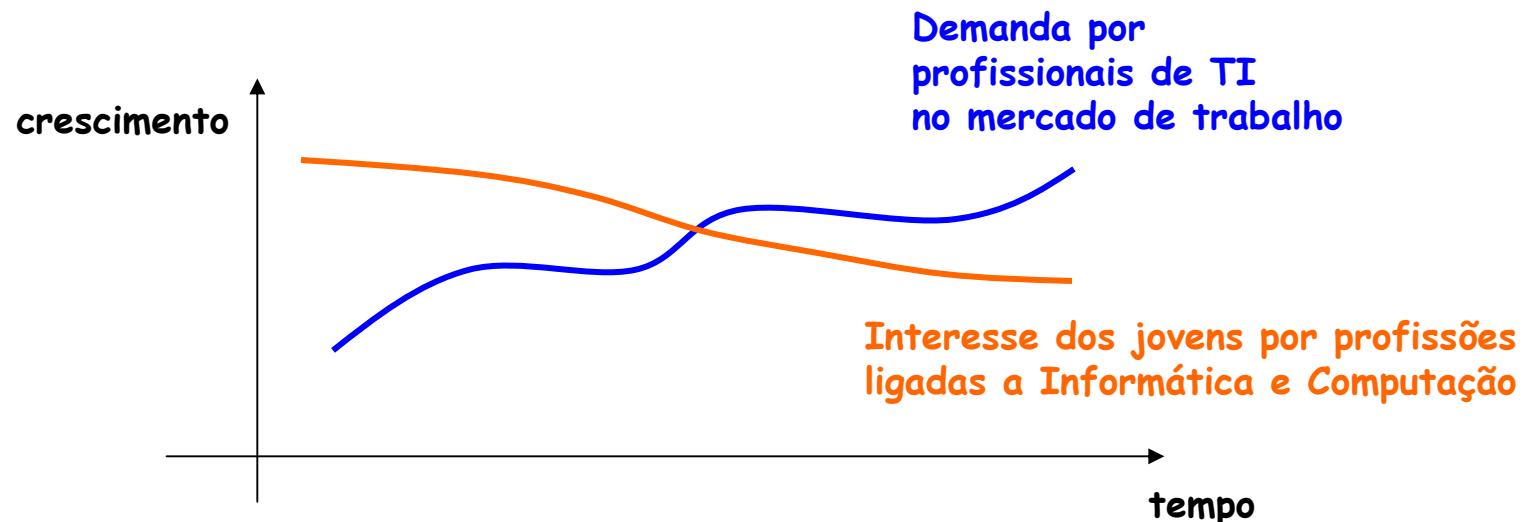
SERG / PUC-Rio

L3D / Colorado University – Boulder

AgentSheets, Inc.

As motivações para o projeto nos EEUU

- Inovar o ensino de Matemática, Ciências & Tecnologia
- Aumentar o interesse dos jovens (de ensino fundamental e médio) pela Informática & Comunicação





A nossa motivação

‘Alfabetismo Computacional’: novo requisito para a participação social plena do cidadão do século XXI

Oi Pai, vamos ao Gmail!

Passo 1 - O seu cursor deve estar piscando no retângulo abaixo. Escreve aqui o seu 'email' e aperta TAB. O cursor vai para o outro retângulo.

Passo 2 - Depois do Passo 1, o cursor deve estar piscando aqui. Digite a sua senha e aperta ENTER. A sua password está escrita num post-it colado no alto do monitor, a sua frente. Qualquer coisa me liga! Beijo.

[Sign in](#) Stay signed in

[Can't access your account?](#)



The collage includes:

- Twitter**: A blue-themed interface with the tagline "Follow your interests" and "Instant updates from your friends, industry experts, favorite celebrities, and what's happening around the world."
- Wikipedia**: A screenshot of the English Wikipedia homepage showing article counts in multiple languages.
- YouTube**: A video player window for "IBM Social Accessibility Project - Introduction" featuring a cartoon illustration of two people interacting with a globe.
- Facebook**: A screenshot of the Facebook homepage with the tagline "Facebook helps you connect and share with the people in your life."
- foldit**: A green-themed puzzle game website for science research.
- Google Earth**: A screenshot of Google Earth showing a 3D model of a village.

INF2705 Linguística Computacional Interativa
2012-2 Profa. Clarisse S. de Souza



O AgentSheets



- Ambiente de desenvolvimento de jogos e simulações que usa uma linguagem visual de programação

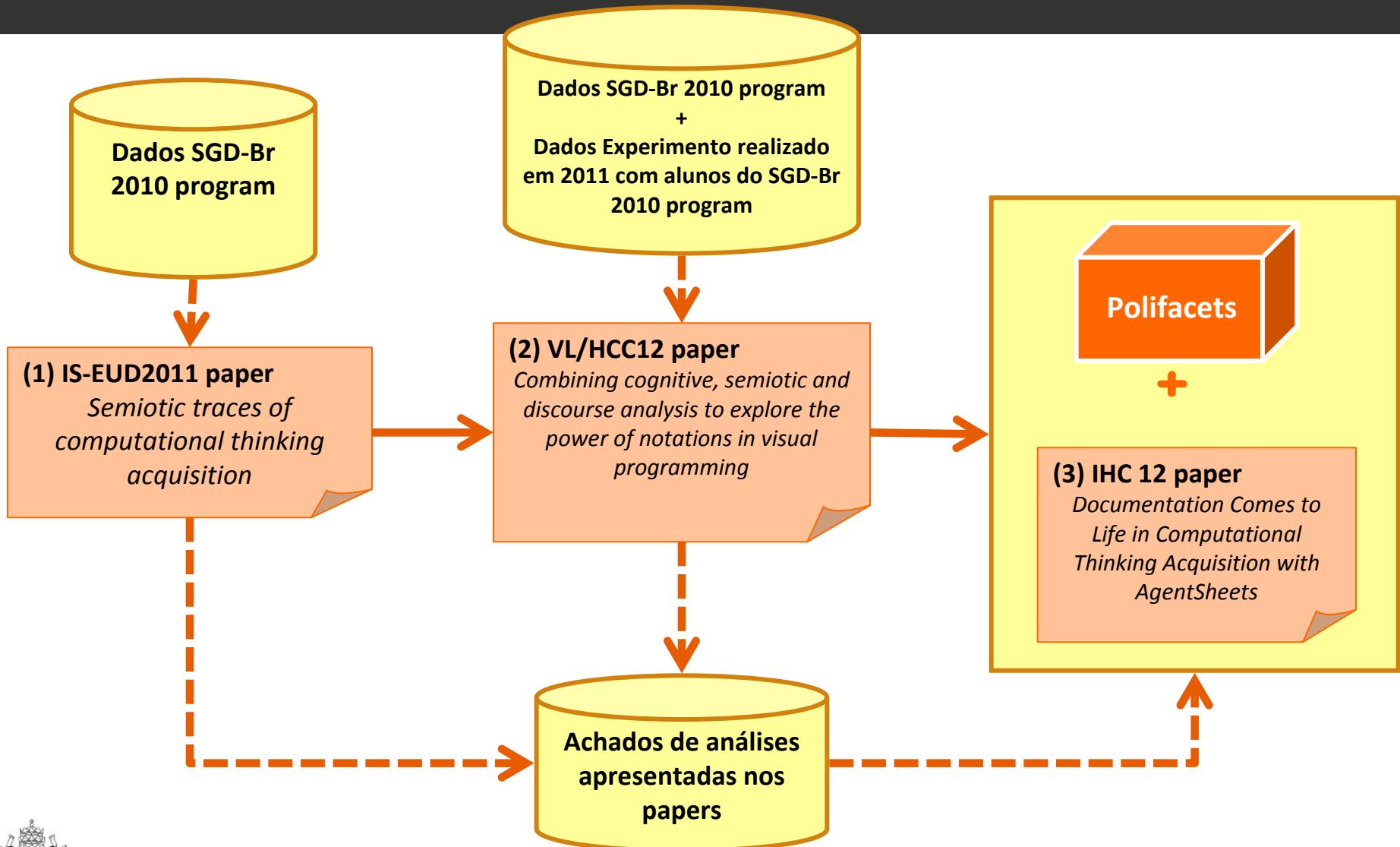


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Nossa pesquisa



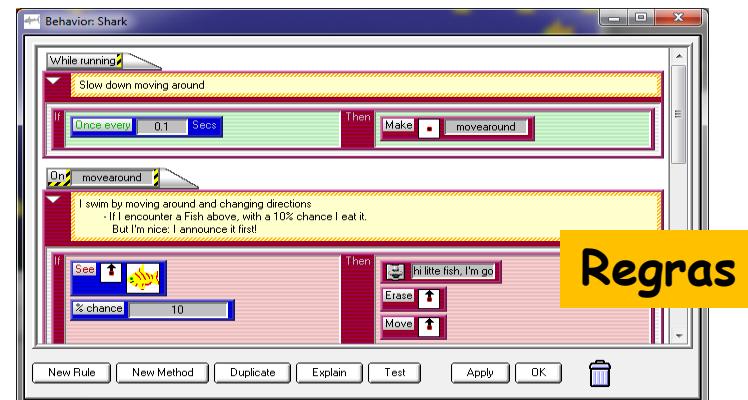
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Nossa pesquisa

9

“Partes” do Jogo no AgentSheets



Fish Tank

Play with Fish, Sharks and other sea creatures in the deep sea. Create your own fish and share them with other AgentSheets users through the Behavior Exchange.

Agents

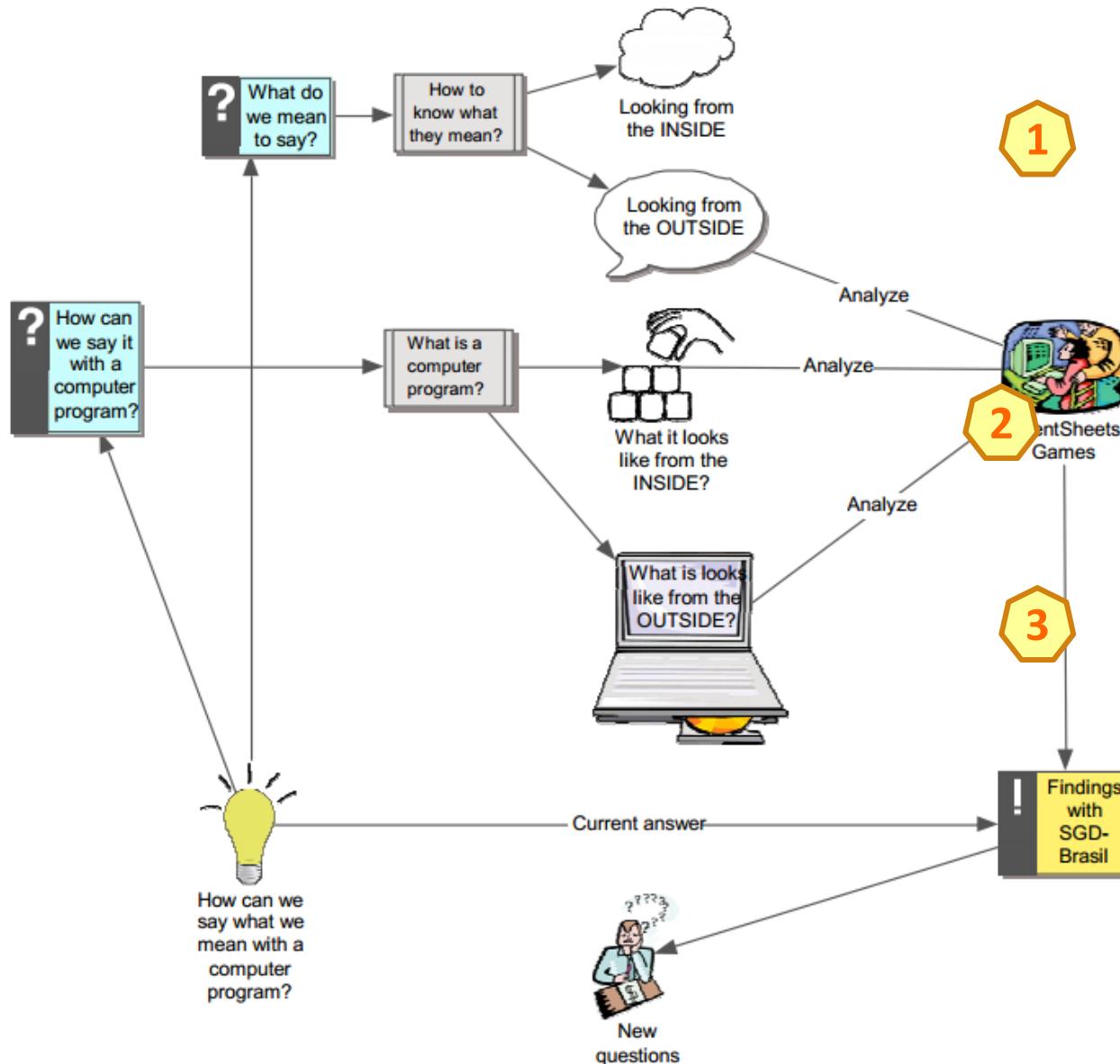
Report

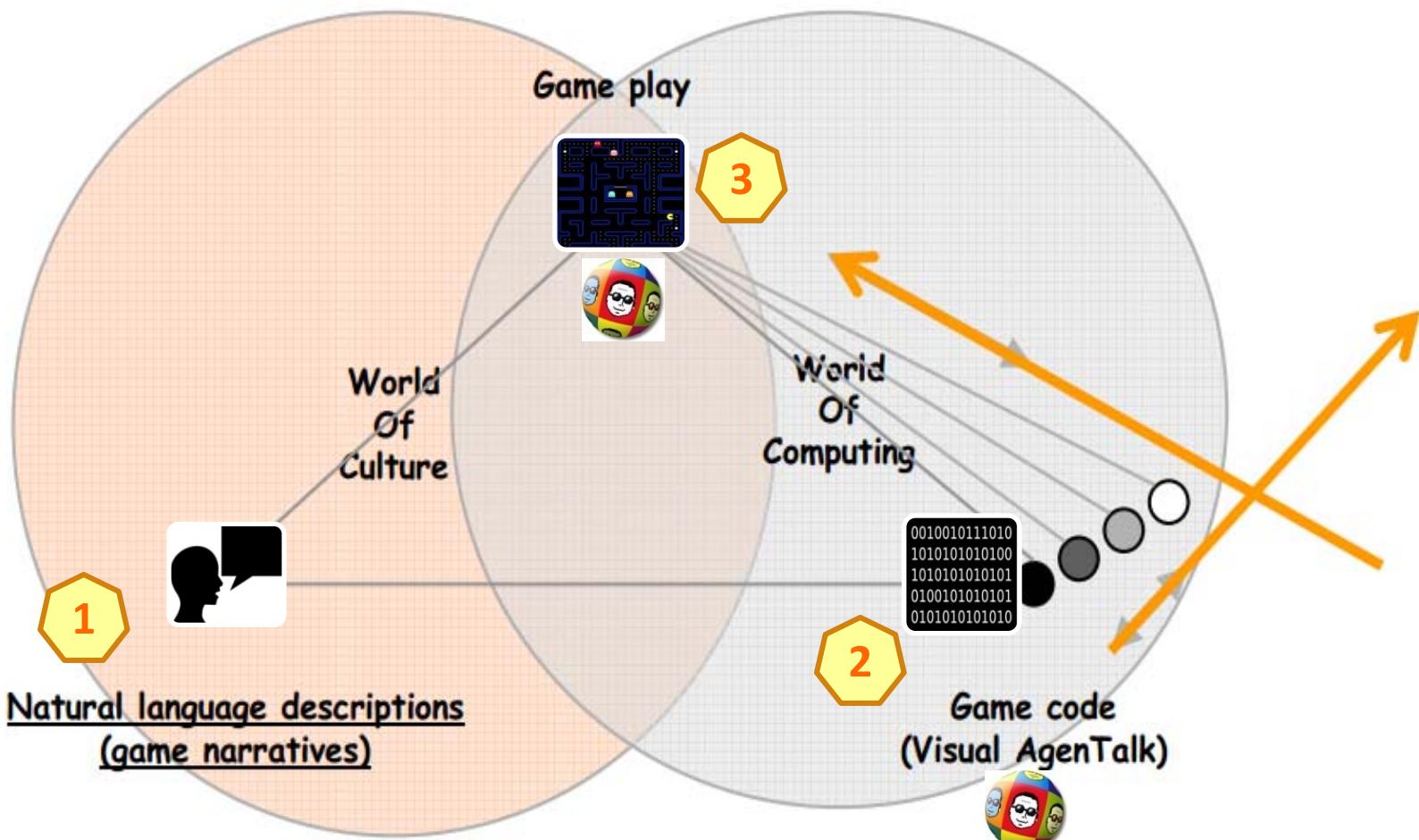
Number of agents: 9

- Cave
- Number of depictions: 2
- End
- Number of depictions: 1
- Fisch1
- Number of depictions: 5

If SEE (↑, 🐟), and %-CHANCE (10)
Then SAY (hi litte fish, I'm gona cat you!), and ERASE (↑), and MOVE (↑)

```
<?xml version="1.0" encoding="UTF-8"?>
<behavior name="Shark" version="1.0" application-name="deepsea">
  <method trigger="ON_DEACTIVATE" >
    <action command="DISPATCH <movearound>" />
    <comment "Slow down moving around">
      <rule>
        <condition command="(ONCE EVERY 0.1seconds EQUALS 10)" created="126116590002" modified="1261165161" />
        <action command="MOVE <movearound>" dispatch="firsttopdown" >
          <comment "I swim by moving around and changing directions">
            <rule>
              <condition command="SEE (↑, 🐟)" created="1261165460804" modified="1261165475332" />
              <action command="MESSAGE (0.0) <movearound>" created="1261165460804" modified="1261165475332" />
            </rule>
            <method trigger="ON <movearound>" >
              <dispatch="firsttopdown" />
              <comment "Announce">
                <rule>
                  <condition command="(% CHANCE (Agent1,2Agent2))" created="1261165475332" modified="1261165475332" />
                  <action command="MESSAGE (1.0)" created="1261165475332" modified="1261165475332" />
                </rule>
                <comment command="(% MOVE (1.0))" created="1261165475332" modified="1261165475332" />
              </method>
            </rule>
          </action>
        </rule>
      </rule>
    </comment "Slow down moving around">
  </method>
</behavior>
```

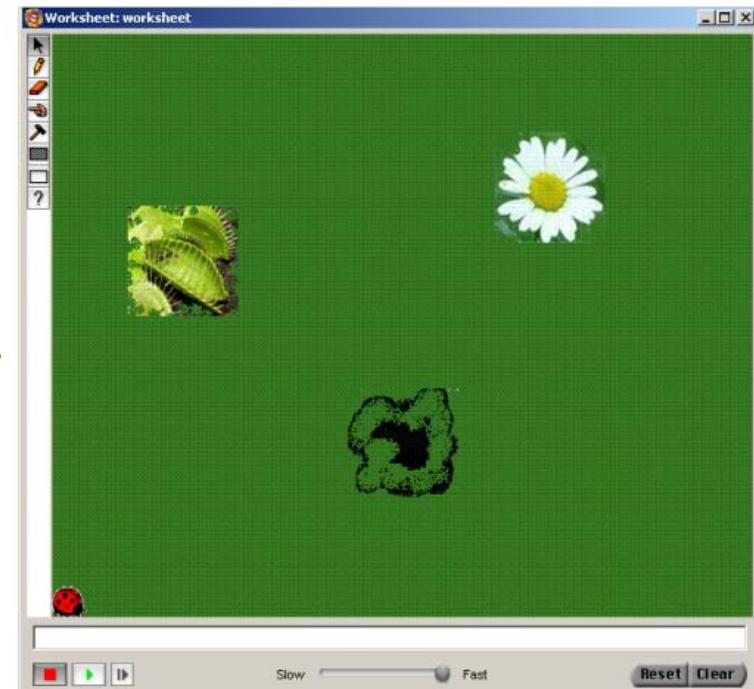
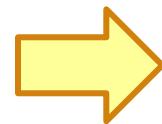






Lembrando da aula passada...

Sistemas de representação e significação distintos comunicam mensagens distintas.





Active (NL) – Passive (VAT) Transformation

─ Lixo

Number of methods: 1

- [WHILE-RUNNING \(\)](#)

"Look: you move this fellow with the arrows. And he collects all the garbage."

WHILE-RUNNING ()

Insira um texto aqui para explicar o que este método faz!

Number of rules: 4

If

SEE (,)

Then

ERASE (), and

NEW (,), and

SET (@valor , para , @valor + 1)



Indeterminate Subject (NL) – Reversed roles in VAT x Game



Guarda

Number of methods: 1

- [WHILE-RUNNING \(\)](#)

▼ WHILE-RUNNING ()



Aluno

Insira um texto aqui para explicar o que este método faz!

Number of rules: 1

Number of methods: 1

- [WHILE-RUNNING \(\)](#)

If
no condition

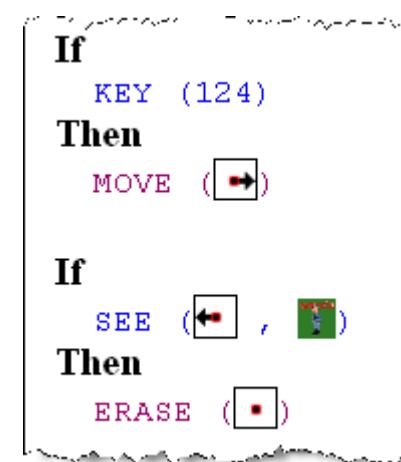
Then
no action

▼ WHILE-RUNNING ()

Insira um texto aqui para explicar o que este método faz!

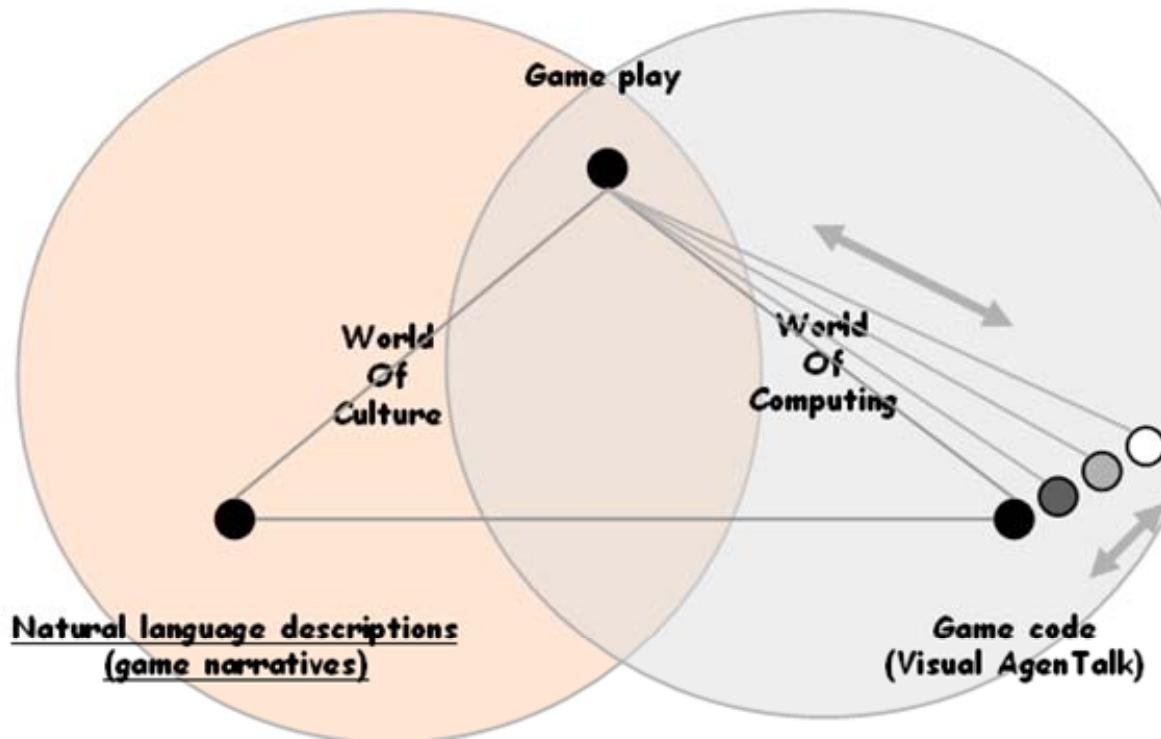
Number of rules: 20

“The little guy has to cross to the other side, [...] he cannot touch the raccoons and the monkeys. If he touches them, **the ranger will appear and he will die**. So, he must get to the other side alive, see?”





Some related concepts and phenomena



- Naming strategies
 - identifiers, arrays, structured data (compositions)
- Token/Type relations
 - classes of objects, specialization (replicas)
- Transitivity
 - aspects and views, default values, code reuse, performance optimization

What is a computer "model"?

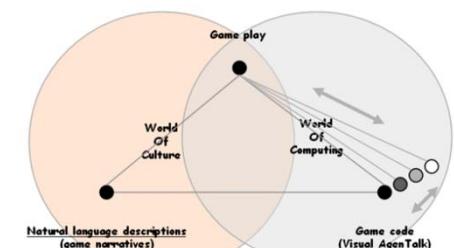




In conclusion: why should we care?

- Computing literacy
 - It is not only about algorithmic thinking, but also (and importantly so) about how you can express your thoughts using computer representations (including algorithms)
- Exploring 3 kinds of content-expression relations
 - Iconic – the significance of perceptual resemblance
 - Indexical – the significance of contiguity
 - Symbolic – the significance of logic and convention

What kinds of computational models are created depending on which signs are chosen?
- Pedagogical possibilities for computing literacy education





Next steps in view

- The meaning of computation
 - What do the kids think computation is depending on what kinds of computational signs they learn to use?
- Scaffolds for computational thinking acquisition
 - **What kinds of additional interface signs and interaction possibilities could we have in AgentSheets to facilitate different levels of computational thinking acquisition?**
- Tracing cultural (and cognitive) dimensions in computational thinking
 - Do kids from different countries, using different languages, use significantly different patterns of expression for related meanings?

Long shot question: what will these answers mean to computer scientists?



**(2) VL/HCC12 paper**

Combining cognitive, semiotic and discourse analysis to explore the power of notations in visual programming

- ❖ Estudantes de 2010 em 2011
- ❖ 2 tarefas: Entender e modificar Fish Tank

Experimento com jogo Fish Tank





(2) VL/HCC12 paper

Combining cognitive, semiotic and discourse analysis to explore the power of notations in visual programming

- ❖ Uso do report “turbinado” como nova representação do AS
- ❖ Design da modificação no report

Representação adicional e extendida Report “turbinado”

The screenshot shows a visual programming environment for a fish tank simulation. The main window displays a 'Background screen' with a boat and several small fish. Below the screen, a 'Agents' panel lists various agent types with their respective numbers of instances and behaviors. A 'Behaviors' panel shows a detailed tree view of behaviors for a specific agent type, such as 'WHEELOWARD'. The interface is designed to facilitate the modification and extension of the report.



(2) VL/HCC12 paper

*Combining cognitive,
semiotic and discourse
analysis to explore the
power of notations in visual
programming*

Interesting findings...

❖ *Recollections of difficulties*

"This was where I was testing with multiple agents ... the movement frequency ... I tested it first putting 1 second for him to move randomly, it was quite slow. Then I lowered it to 0.5 seconds, but it was still slow ... So, I kept on lowering it [till it was OK]... At the time of the [2010] project it was something that I had a hard time mastering.





(2) VL/HCC12 paper

*Combining cognitive,
semiotic and discourse
analysis to explore the
power of notations in visual
programming*

Interesting findings...

❖ “Aha! Moments”

- Breakthrough in understanding
- Wrong understandings got corrected

“The shark has a will of its own and the little fish too...nobody wants to obey me.”

“Hmm... so this is what happens!”.

“Oh! So, I have this [other] possibility to compose the background of the game... I built all my background with agents, which sometimes caused a lot of trouble.”

***The combination of the dynamic and static
representations of the complete program promoted
new levels of comprehension***





(2) VL/HCC12 paper

Combining cognitive, semiotic and discourse analysis to explore the power of notations in visual programming

Interesting findings...

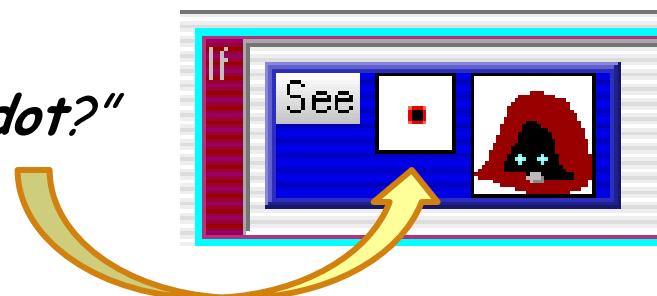
❖ More “Aha! Moments”

❖ Led to reinterpretation of the dynamic representations

“the cave () ... seems to have a little pair of eyes in it ()”.

❖ Led to confrontations with one’s own gaps in the learning process.

“What is this dot?”



- Visual notation for self-reference
- Learned that the dot mattered in AgentSheets rules.



(2) VL/HCC12 paper

*Combining cognitive,
semiotic and discourse
analysis to explore the
power of notations in visual
programming*

Interesting findings...

❖ *More “Aha! Moments”*

❖ **Led to confrontations with one's own gaps in the learning process (cont.)**

- The Fish Tank made a extensive use of the “dot” (Visual notation for self-reference)
- The student depended on the “dot” meaning to make sense of the Fish Tank program



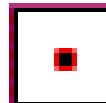
(2) VL/HCC12 paper

Combining cognitive, semiotic and discourse analysis to explore the power of notations in visual programming

Interesting findings...

❖ ***More “Aha! Moments”***

❖ **More about the “dot”**



- Difficulties in dealing with inverted semantic transitivity
- The functional use of self-reference did not always correspond to the semantics of self-reference in reality

What does it mean? What can I do with it?...

“When the carrot saw the rabbit next to it, the carrot deleted itself.” (description of the 2010 program student’s game)

(2) VL/HCC12 paper

*Combining cognitive,
semiotic and discourse
analysis to explore the
power of notations in visual
programming*

Concluding remarks

- ❖ *The benefits of the complete program structure and content that is the report*
- ❖ *The teacher's testimonial about the program report as another "representation tool" for teaching computational thinking*



"Orienting the learners without this report was confusing, because the student needs to click on one agent, visualize its rules, many times doing the same thing many times. In general they cannot remember the whole set of rules for every agent. So, using the report gives us a broad view of all agents and how each one is programmed."

(3) IHC 12 paper
Documentation Comes to Life in Computational Thinking Acquisition with AgentSheets



- ❖ Artigo sobre o uso de documentação ativa no contexto de ensino de raciocínio computacional com o AgentSheets
- ❖ O PoliFacets é uma ferramenta para explorar as múltiplas facetas de jogos

PoliFacets

Motivação

- Documentação é um componente crítico
- Estudos anteriores indicam a necessidade de novas representações do jogo

O PoliFacets

- É um mediador entre os usuários, o AgentSheets e as múltiplas representações dos jogos
- Enriquecimento dos significados existentes
- Descoberta de novos significados
- Espaço de reflexão
- Permite ‘conversar’ com o jogo e suas representações

Experimento

- Participantes/procedimento
 - Instrutores do AgentSheets
 - Apresentação do PoliFacets
 - Questionário com questões abertas
 - Conversa final
 - Professores que participariam do SGD-Br
 - Tarefa de modificação de um jogo (parte 1)
 - Apresentação do PoliFacets
 - Tarefa de modificação de um jogo (parte 2)
 - Conversa com o grupo



Resultados

- Dificuldades de aprendizado
 - Agente (sujeito) da ação
 - Relações AND e OR
- Abstração
 - Classe Vs Instância
- Lógica de execução do programa
 - Ordem das regras (ideia de conflito?)

POINT**Description:**

While the game is running, Point has the following behavior:

1) If this agent is stacked immediately below agent Pacman then it erases itself.

A

While the game is running, Point has the following behavior:

- 1) If this agent sees  when looking right then it erases itself.
- 2) If this agent sees  when looking down then it erases itself.
- 3) If this agent sees  when looking left then it erases itself.
- 4) If this agent sees  when looking up then it erases itself.

B

Resultados (2)

- Reconhecimento do valor do PoliFacets
 - Espaço na web FAQ/Envio de perguntas
 - Detalhes sobre a planilha
- Aplicação do PoliFacets
 - Documentação
 - Ensino
 - Depuração de erros
- Novas funcionalidades para o PoliFacets
 - Batalha Naval
 - Malha de interação entre os agents
 - Fórum

Considerações finais

- Resultados indicam que estamos no caminho certo
- Ainda é preciso melhorar
 - Mas os participantes já começaram a ter *insights* sobre o ensino e aprendizado do raciocínio computacional, além de esclarecerem dúvidas ou mal entendidos
- Trabalhos futuros
 - Pesquisas sobre o uso do PoliFacets durante o projeto
 - Tese da Marcelle



Sobre a ‘Lógica do Jogo’

Módulo do **PoliFacets** Ligado à
Pesquisa de Doutorado de
Marcelle Mota

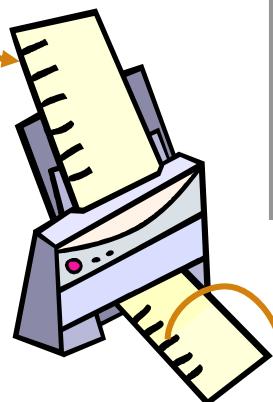




O que o módulo está fazendo atualmente?



Arquivo VAT



```
<?xml version="3.0" encoding="UTF-8"?>  
  
<behavior name="Animal2" version="2.0" application="asj-3.0.1b" x="350" y="85" width="632" height="400">  
  <method trigger="(WHILE-RUNNING)">  
    dispatch="firststopdown"  
    twistdown="true"  
    comment="Insira um texto aqui para explicar o que este módulo faz!">  
    <rule>  
      <if>  
        <condition command="(SEE (0 1) "animal5")" created="1289418605250" modified="1289418611390"/>  
      </if>  
      <then>  
        <action command="(ERASE (0 1))" created="1289418614203" modified="1289418616781"/>  
      </then>  
    </rule>
```

ANIMAL2

O agente Animal2 aparece assim:



Descrição:

Enquanto o jogo está rodando, Animal2 tem o seguinte comportamento:

- 1) Se este agente vir ao olhar para a direita então ele apaga o agente que ele vir quando olhar para a direita.

**Texto Automaticamente
Gerado em 'Português'**



Texto ‘em fase de aprimoramento’

1) Se este agente vir  ao olhar para a direita então ele apaga o agente que ele vir quando olhar para a direita.



```
<rule>
<if>
<condition command="(SEE (0 1) &quot;animal5&quot;)"
           created="1289418605250" modified="1289418611390"/>
</if>
<then>      <action command="(ERASE (0 1))" created="1289418614203"
           modified="1289418616781"/>
</then>
</rule>
```



Texto ‘em fase de aprimoramento’

1) Se este agente vir ao olhar para a direita então ele apaga o agente que ele vir quando olhar para a direita.



Se este agente vir ao olhar para a direta, ele [apaga o que viu].

```
<rule>
  <if>
    <condition command="(SEE (0 1) "animal5")"
      created="1289418605250" modified="1289418611390"/>
  </if>
  <then>    <action command="(ERASE (0 1))" created="1289418614203"
    modified="1289418616781"/>
  </then>
</rule>
```



Onde gostaríamos de chegar

- 2) Se este agente vir  ao olhar para a direita então ele move-se para esquerda.
- 3) Se este agente vir  ao olhar para a esquerda então ele move-se para direita.
- 4) Se este agente vir  ao olhar para baixo então ele move-se para cima.
- 5) Se este agente vir  ao olhar para cima então ele move-se para baixo.

- Se este agente vir  ao olhar para a direita, esquerda, para baixo ou para cima, ele move-se **na direção oposta**.



Por que gostaríamos de chegar lá

- Porque imaginamos que se os aprendizes pudessem 'brincar' com as diferentes representações verbais e visuais do jogo, produzidas pelo sistema ou por eles próprios, ganhariam habilidades expressivas relevantes e diferenciadas.



- Porém, não sabemos se isto é verdade. Daí estarmos 'pesquisando' e querendo encontrar professores parceiros para nos orientarem.