# Script Cards: A Visual Programming Language for Game Authoring by Young People

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# Outline

- Background
- Gamemaker Workshops
- Neverwinter Nights Aurora Toolset Demo
- Script Cards Design Process
- Script Cards Demo
- Evaluation
- Conclusions and Further Work

# Background

- Game authoring has been investigated as an educational activity in a number of areas:

  - Introducing children to computer science.

  - Encouraging more sophisticated learning (e.g. developing metacognitive skills).

  - Improving creative writing and narrative skills.

# Background

- **Commercial game authoring toolkits** now allow novices to create their own interactive stories in game form.

- Game creation has potential to **develop young people's narrative skills** (Robertson and Good, 2006) and offers a number of additional motivational and learning affordances (Good and Robertson, 2006).

# Gamemaker Workshops

- At **Gamemaker workshops** participants learn to create their own game using the Neverwinter Nights (NWN) Aurora toolset.

- 270 participants have attended workshops over the past 3 years.

- Stories contain elaborate, plots (romance, revenge, satire, moral conundrums).

- Complex, lengthy, branching dialogues.

# Neverwinter Nights Aurora Toolset Demo

**Demo**

# NWScript

- **NWScript** (based on C):

```
#include"nw_io_generic"

void main()
{
  object oPC = GetLastUsedBy();
  if (!GetIsPC(oPC)) return;

  object oTarget;
  oTarget = GetObjectByTag("GUARD_1");
  AdjustReputation(oPC, oTarget, -100);

AssignCommand(oTarget,DetermineCombatRound(oPC));
  AssignCommand(oTarget, ActionAttack(oPC));
}
```

# NWScript

- Problems:
  - ◆ NWScript too complex for Gamemaker participants to master during a workshop.
  - ◆ Scripting detracts from the primary goal of fostering children's narrative skills.

- Solution?
  - ◆ An alternative to scripting which would allow children to specify complex plot events using a combination of graphics and natural language.

# Script Cards Design Process

- Many visual programming languages (VPLs) are designed specifically for novices/children, as they can provide very intuitive interfaces. E.g. Show and Tell, ToonTalk, Alice and AgentTalk.

- VPLs have already been used in the area of game creation. E.g StarLogo TNG and Stagecast Creator.

# Script Cards Design Process

- A **learner-centred design** approach was adopted to ensure that the software provided the required functionality and was usable by the target age group.

  - ◆ **Usability and functional requirements** were established based on data collected at dedicated requirements gathering workshops with target users, and analysis of data collected at previous Gamemaker workshops.

  - ◆ A **low-fidelity prototype** was created and tested with target users to inform improvements to the design of a high-fidelity prototype.

# Analysis of Existing Data

- Data gathered at previous Gamemaker workshops provided useful information.

  ◆ Games created at workshops were analysed to assess the most popular plot events requiring scripting.

  ◆ Participant interview data gave useful information on difficulties experienced by participants (scripting and textual identifiers were singled out).

# Gathering New Data

- Eleven children aged eleven and twelve took part in a series of after school workshops, consisting of four ninety-minute sessions.

- These workshops were organised and run with two primary aims:

  1) To gather information about the way children conceptualise story events;

  2) To provide an environment in which a low-fidelity prototype of the system could be tested.
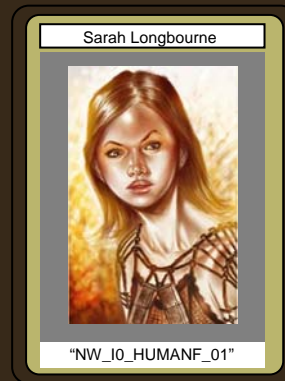
# Gathering New Data

- Requests made by participants for help including a story event in their module provided a wealth of information about the way target users conceptualise story events.

- E.g. One of the more common requests was for an NPC to join the player as a 'henchman', and the way participants asked for help with this is indicative of the general trends observed.

  - ◆ Participants typically represented the request for a henchman by asking questions such as "How can I make this Dragon help me?" and "How can I make this guy fight on my side?".

# Interface Design

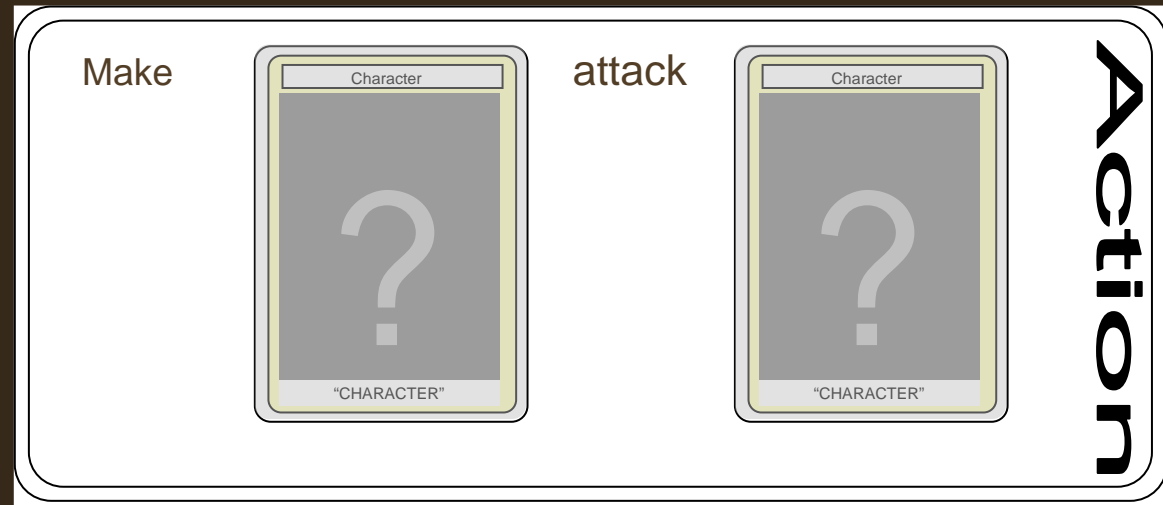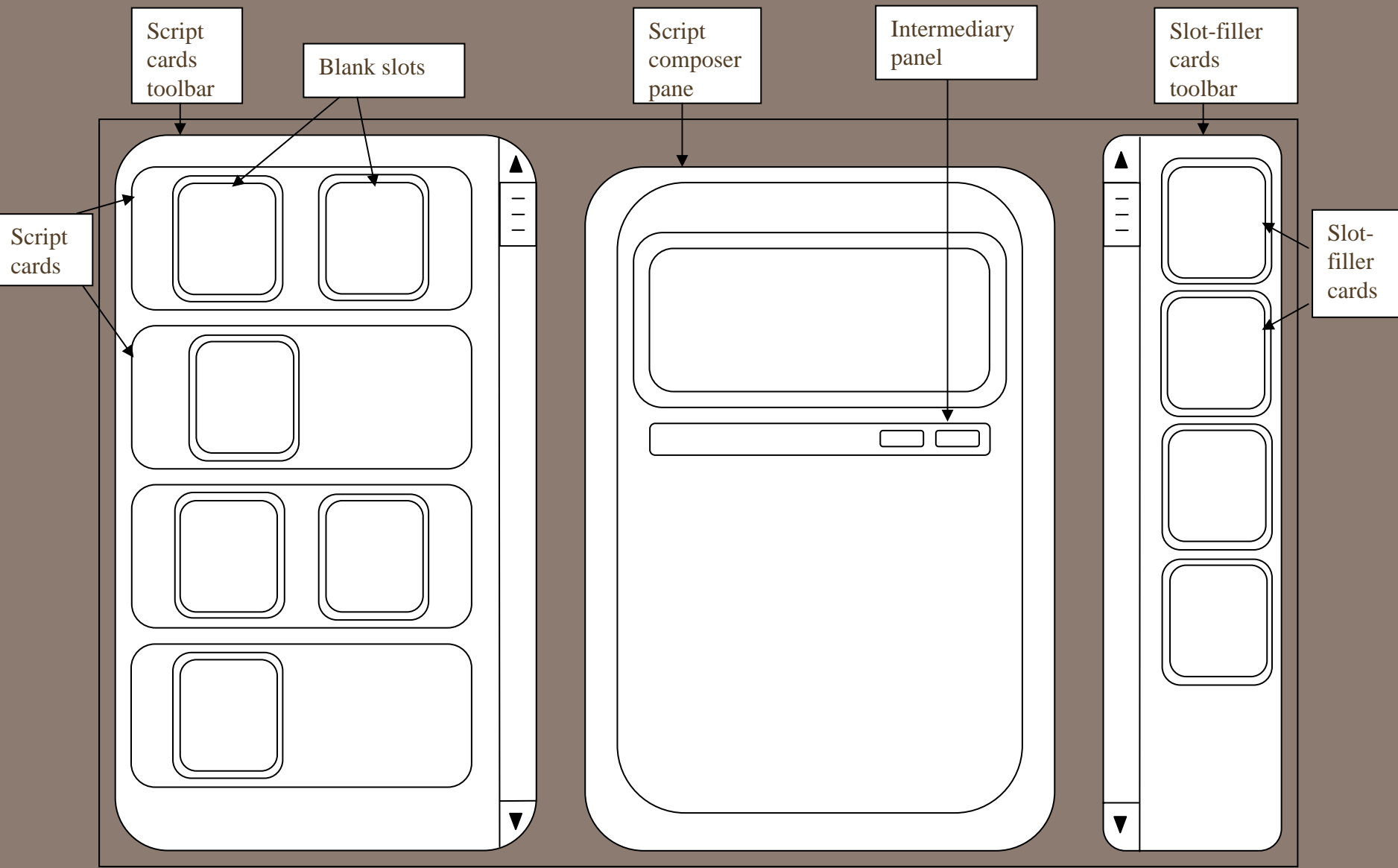- ## Representation of game objects primarily graphical

| Sarah Longbourne | Moonstone Mask | Large Chest |
|---|---|---|
| "NW_I0_HUMANF_01" | "NW_I0_MASK_01" | "Chest2" |

Slot filler Cards

# Interface Design

- Story event construction process scaffolded by adding to pre-existing structure.

| Make | Character | attack | Character | Action |
|------|-----------|--------|-----------|--------|
|      | ? "CHARACTER" |     | ? "CHARACTER" |        |

Action Card (also
When and If cards)

Script
cards
toolbar

Blank slots

Script
composer
pane

Intermediary
panel

Slot-filler
cards
toolbar

Script
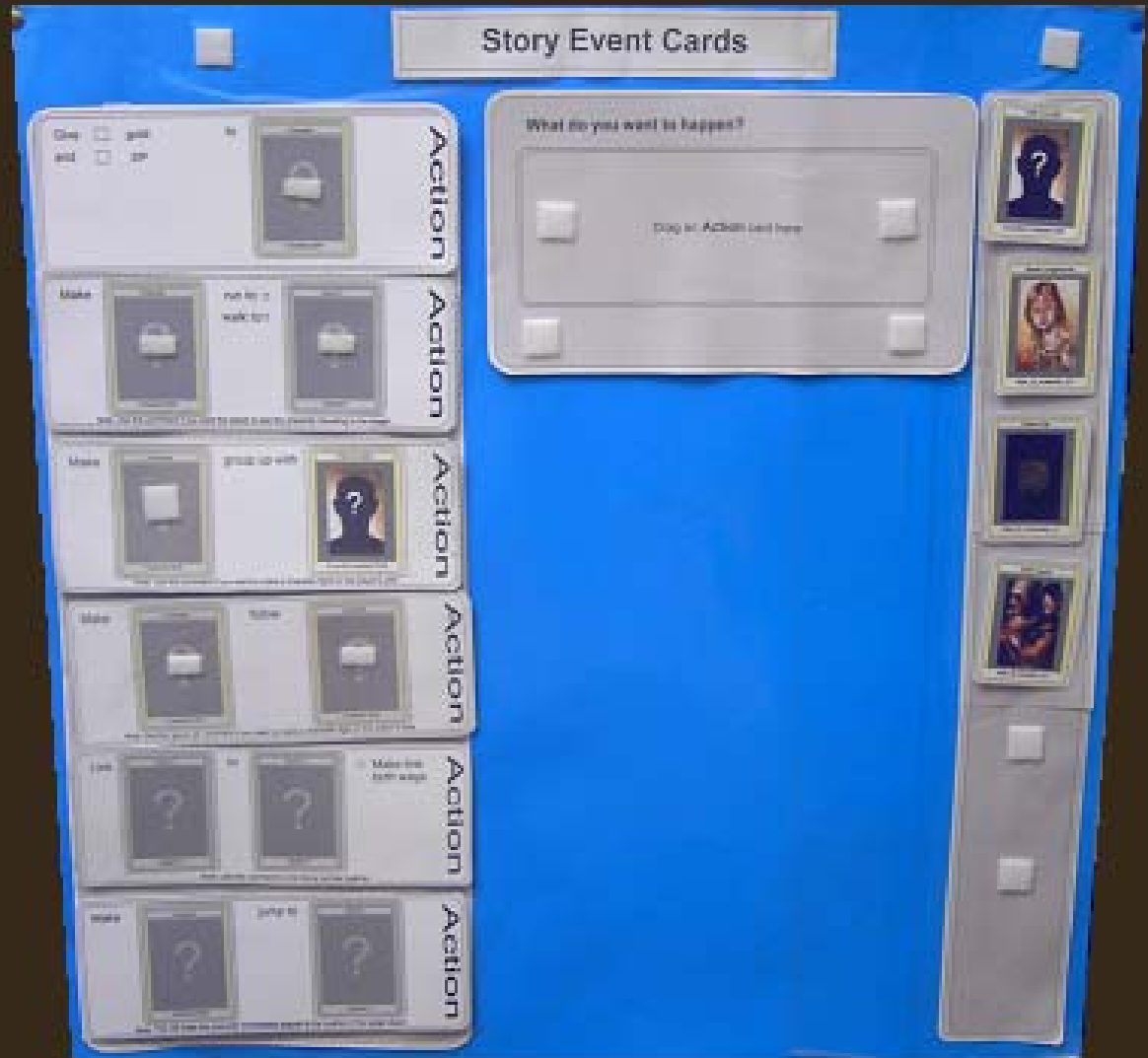cards

Slot-
filler
cards

# Low-Fi Prototype

# Low-Fi Prototype Findings

- Participants could create story events using the card metaphor
- Interface could be improved by making scaffolding less strict:
  - Users think of story event structures in a variety of orders
  - Users don't necessarily populate cards with slot-fillers from left to right.

# Script Cards Demo

Script Cards

# Evaluation

- Ten participants aged 13-15 took part on an initial evaluation of Script Cards on the last day of a five day Gamemaker workshop.

- The evaluation focussed on the extent to which participants could learn to use Script Cards to construct story events within a short session (direct comparison with NWScript not feasible).

- Participants were set three tasks which required them to create a story events using Script Cards based on a natural language description of an event.

# Evaluation

- **Task Completion Rates**

| Task 1 | Task 2 | Task 3 |
|--------|--------|--------|
| 9 | 10 | 8 |

- **Observation of participant interactions**
  - ◆ 11 requests for help/ advice
    - 4 due to minor bugs
    - 7 due to possible interface problems

# Evaluation

- High rate of task completion

- Participants responses were positive:
  - One participant stated that "it makes sense… you can just read it like this, and it's easy to know what will happen".

  - Another noted that there is no need for "special words" with Script Cards as "you just use simple sentences".

  - Two participants stated that Script Cards seemed to make scripting faster as well as easier, and one went on to say that "you make less mistakes, and if there is a mistake you can fix it a lot easier"

  - "It's a lot better than 'bla, bla, bla oHenchman oMaster'".

# Conclusions

- Script Cards allows young people to use graphics and natural language to express NWN plot events in a way which is as close as possible to the way they describe these events to others.

- An evaluation of Script Cards suggests that the prototype system achieved its aim and was well liked and understood by target users. Evaluation highlighted possible improvements for language interface.

# Ongoing and Further Work

- Extension of the scope of the system to cover a wider range of possible plot events.

- Iterative interface design (possible analysis using Green's Cognitive Dimensions of Notation)

- A visual language for composing interactive plots?!

# References

- Robertson, J. and Good, J. (2006). Children's narrative development through game authoring. *TechTrends* 49: pp. 43-59.

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# Questions?

- Any questions or suggestions?