

MINWii: A Music Game for Demented Patients

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Dementia

Dementia: A serious loss of cognitive ability in a previously unimpaired person. Most common form: Alzheimer's disease (50% of new cases).

- Mostly affects **conscious memory**, **attention** (the ability to selectively allocate cognitive resources) and **execution** (the ability to plan and act in a goal-directed way).
- Patients consequently suffer from **depression** and **behavioral disorders**, dangerous for themselves (agitation, wandering) and those around them (pathological negligence and imprudence).

Renarcissization for Home Stay

Renarcissization: the process by which patients recover their **self-esteem** by engaging in adapted, fun activities that emphasize their strengths and minimize their disabilities.

- A fun, renarcissizing activity should enhance **quality of life (QoL)** and reduce **behavioral symptoms** (negligence, imprudence) by alleviating patients' need to prove their worth by trying to do things they cannot do anymore.
- Patients with less severe behavioral disorders can be **kept at home** longer with minimal daily help. This both enhances QoL and **saves money** (institutionalized patients cost two to three times more).

This gives us three main design objectives:

1. **Low motor and cognitive requirements**, to make the game accessible to elderly demented patients.
2. **Pleasurable rewards** for players of all levels and positive feedback centered on **effort**, not performance, to make the experience enjoyable and renarcissizing.
3. A cheap yet easy-to-use, robust and versatile setup to fit **all kinds of environments** (institutions, hospitals, homes) and caregivers (family, personal assistants, health professionals).

Therapeutic Validation

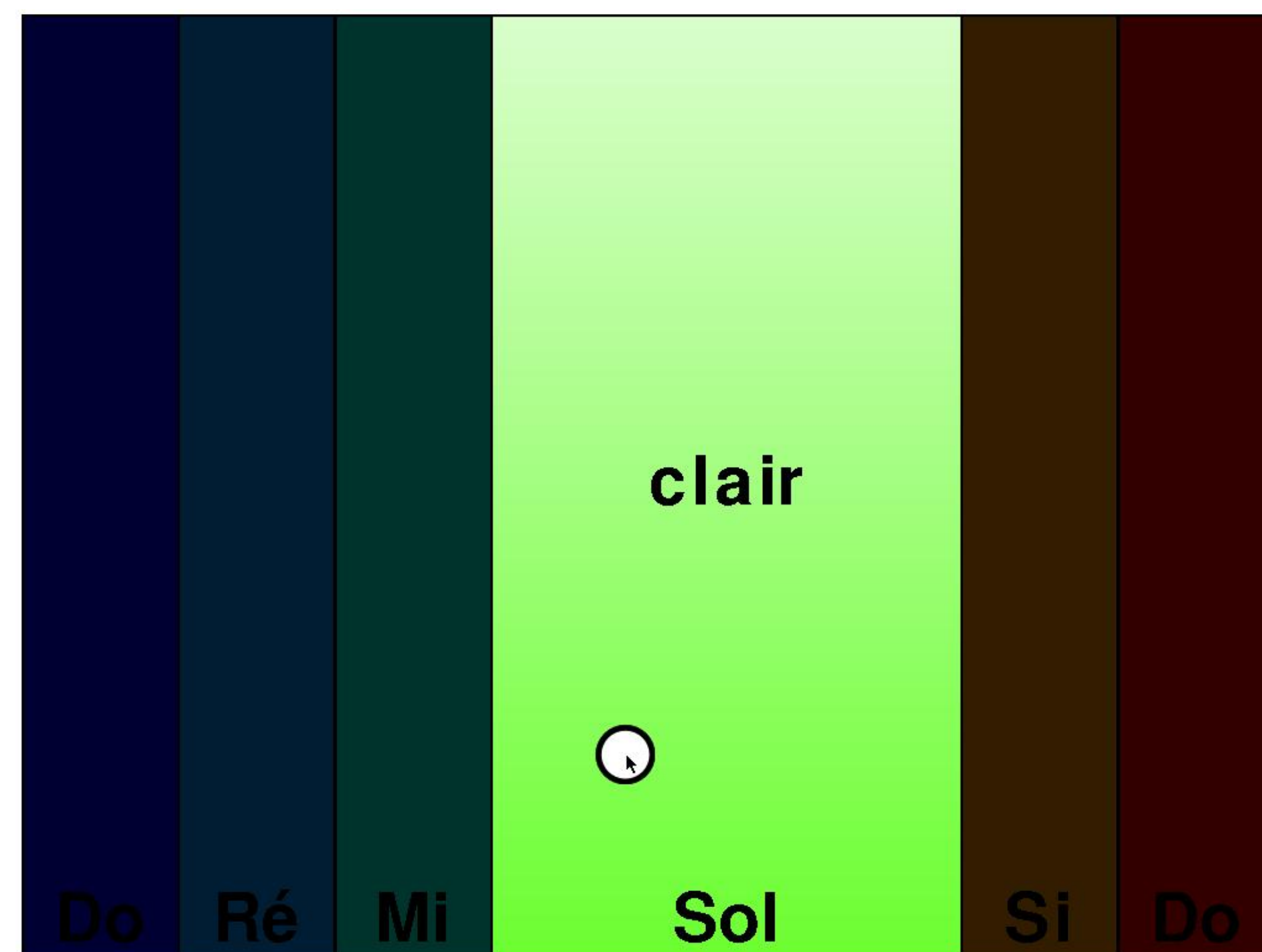
Our next goal is to validate MINWii's **therapeutic impact** in a randomized control experiment. We will assess:

- **QoL** in patients staying at home (QoL-AD questionnaire).
- **Behavioral symptoms** in institutionalized patients (NPI questionnaire).
- **Impact on cognitive functions**, especially attention (Posner networks).

References

- [1] S. Benveniste, P. Jouvelot, R. Péquignot. The MINWii Project: Renarcissization of Patients Suffering from Alzheimer's Disease Through Video Game-Based Music Therapy In *Proceedings of the 2010 ACM International Conference on Entertainment Computing*

Pointing

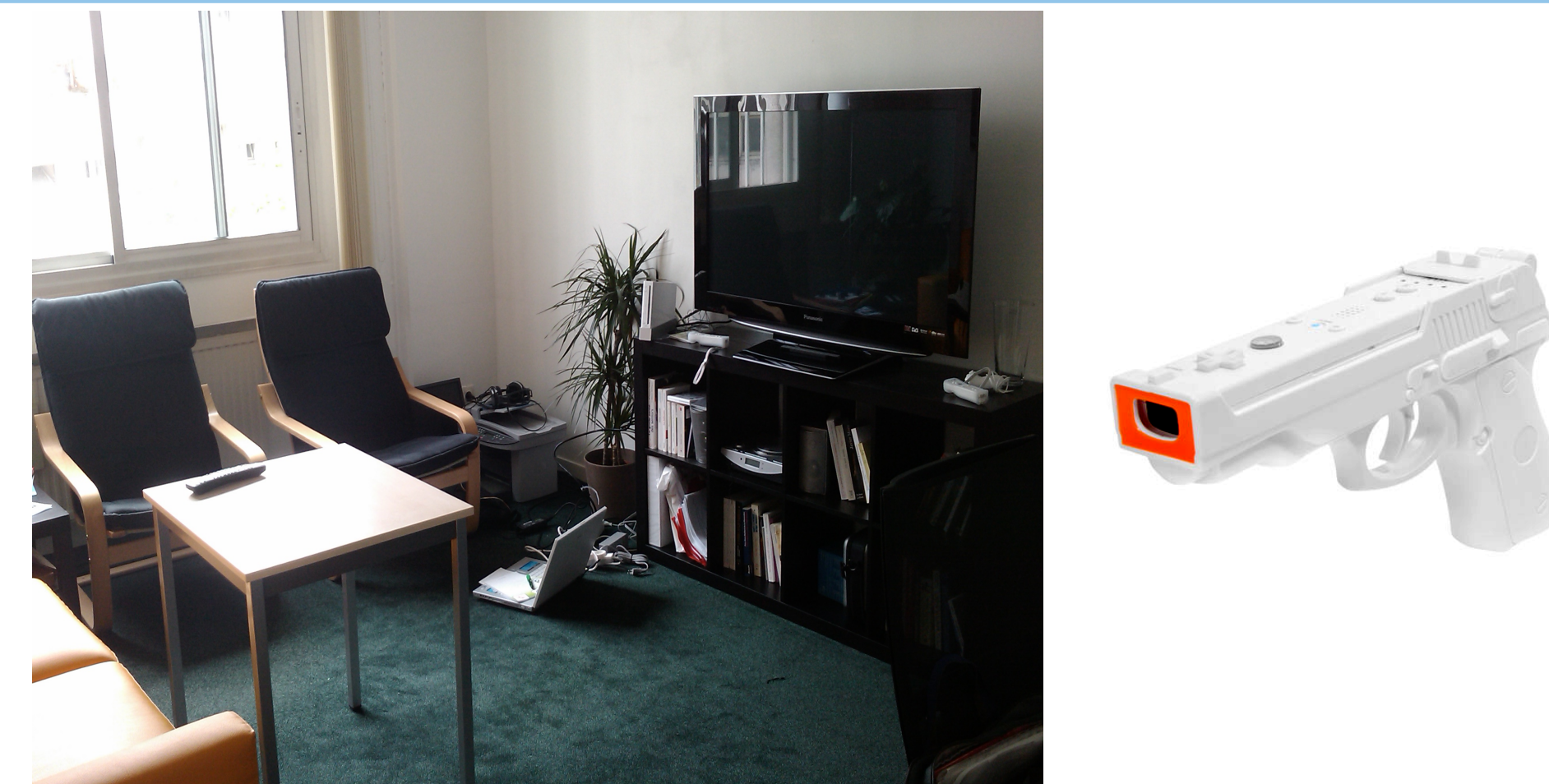


Reminiscence Mode

Our pointing-based interaction model accommodates elderly, demented patients:

- It requires only small movements of **one articulation** (the wrist).
- Its cognitive load is very low with only **one button** and **one visual focus**.

Action Research

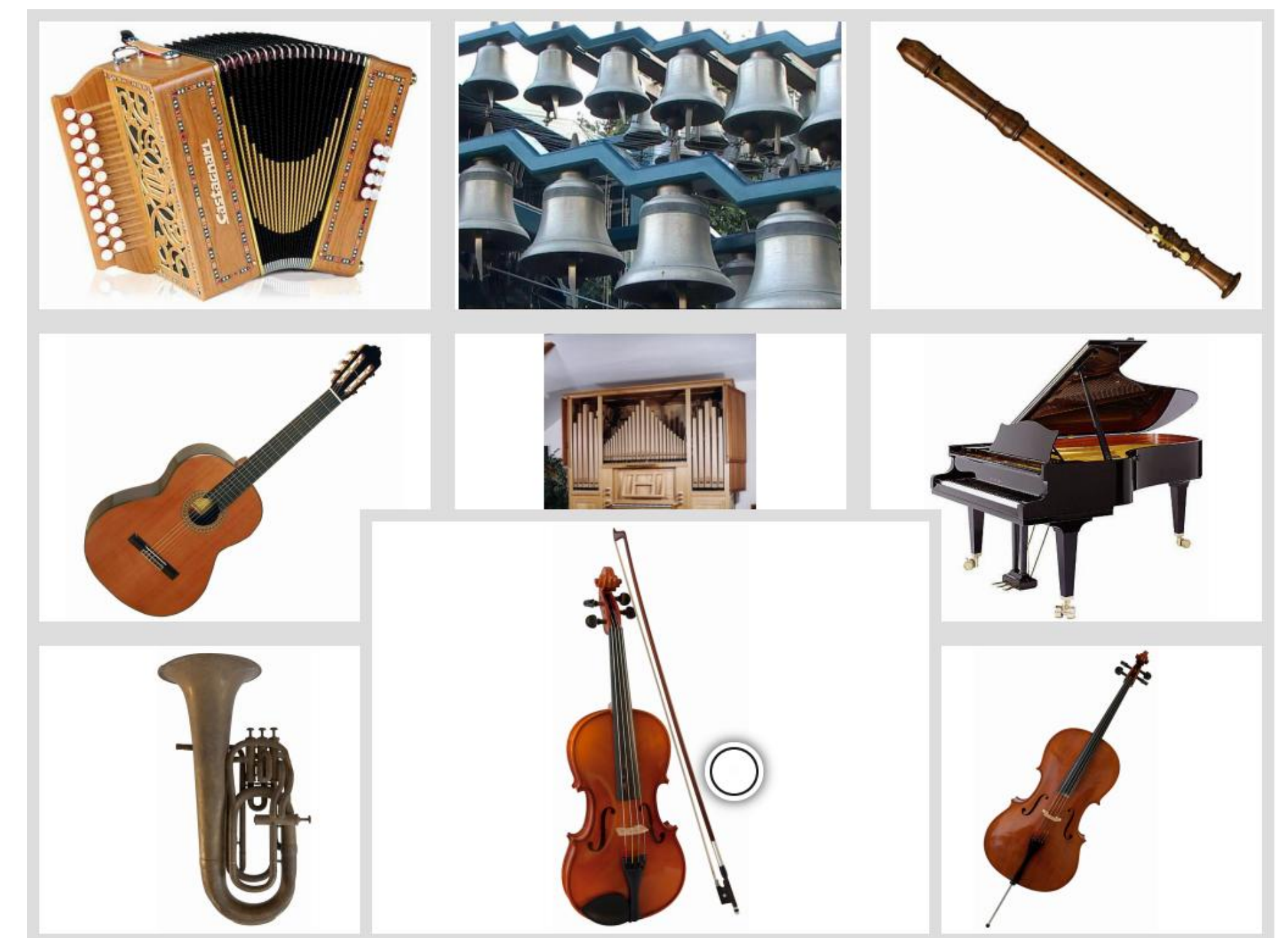


The Living Lab and Wiiote Pistol

Three key design choices make MINWii flexible and easy to deploy for **large-scale diffusion**:

1. **User-centric, incremental design** guarantees usability in real clinical settings.
2. **Off-the-shelf components** (Wiiotes, TV, low-end PC...) keep the system cheap.
3. **Free software** enables us to distribute MINWii free of charge at www.minwii.org.

Sounds and Songs

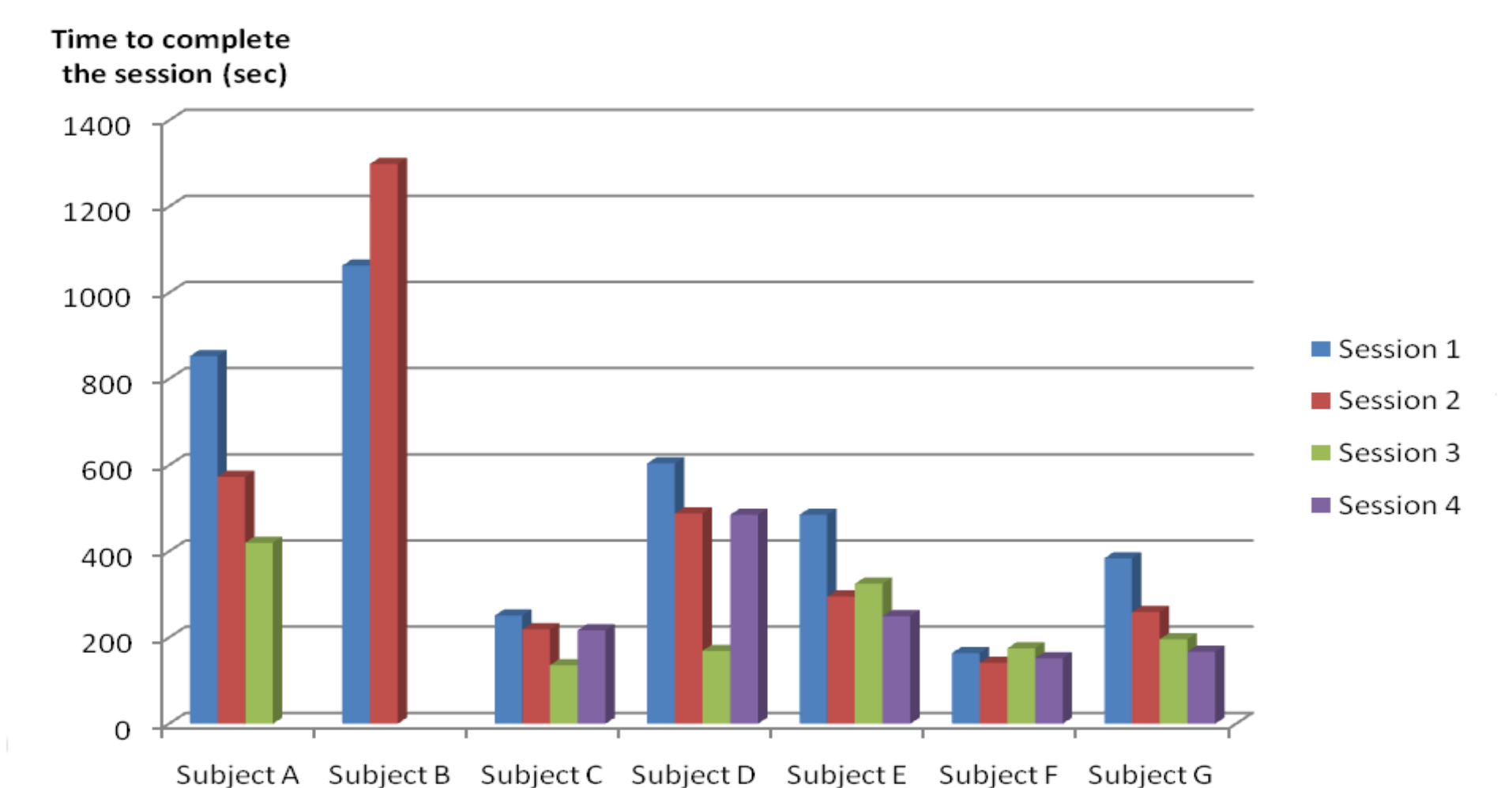


9 familiar instruments

We aim for a **soothing experience** that reminds patients of their past musical pleasures using:

- Well-known **children's songs** and popular tunes from their youth.
- Familiar, soft-sounding instruments with a large diversity of sounds.

Implicit Learning



Time to complete the test song (last session unassisted)

During a pilot, small-scale quantitative evaluation, patients exhibited either instant mastery or a **clear learning effect**:

- 5/6 patients performed better over time: MINWii relies on **well-preserved skills** that can still improve with training.
- Patients progressively became able to play unassisted and expressed high overall levels of satisfaction (mean 18/28)

Results

1. MINWii's gameplay can be both **failure-free and fun**, even for highly impaired patients, as long as proper guidance and motor/cognitive assistance are provided:
 - Improvisation generates strong anxiety while challenge either deters patients or distracts them from the music.
 - However, due to their age and cognitive deficits, the **most basic gameplay can be fun** for patients, even with little to no challenge nor freedom of action.
2. Difficulty should be lowered to a minimum to **emphasize reminiscence**:
 - **Musical memory** is often surprisingly well spared and is thus a very useful **tool for renarcissization**.
 - Playing MINWii with very low difficulty evoked several powerful reminiscence episodes that seemed very **pleasurable and stimulating**.
3. **Human contact** remains the centerpiece:
 - MINWii fosters better relationships between patients and caregivers by giving them the chance to share an activity that is **fun for both**.
 - Used in **group sessions**, MINWii helps patients bond with each other by encouraging collaboration in the form of an "I play, you sing" dynamic.