PlayableGames

Wiisearch: designing intuitive controls for users

User expectations of the Wiimote functions

At PlayableGames, we've performed a series of user research studies with the Wiimote and Nunchuck, to try and uncover what users currently expect each function to do. At first glance, it looks as if such a novel control mechanism has very few reference points, and that consistent user expectations will be hard to uncover.

However, our research found that there are still legacy mental models from other controllers. By this, we mean that ingrained expectations of what buttons do what from using other controllers are still to be found when users use the Wiimote and Nunchuck.

Evolution

This is a very unusual moment in games development. Game control mechanisms have tended to evolve gradually over time, from eight-direction keypads, to analogue sticks, then the addition of extra buttons and triggers, and rumblepacks, etc. However, the movement sensing functions of the Wiimote do not have any precedents to help designers understand which make most intuitive sense to users for different actions. For example, what is the best way to allow users to open a door? Wiggle the Nunchuck or press a button?

Novelty in design

This novelty may be a double-edged sword though. On the one hand it means that there are multiple new ways of allowing users to interact with games, which is a whole new world of fun; a massive potential. But, on the other hand, there are no conventions yet for how users expect the controller's actions to be used in a game.

For example, on a more conventional controller, there are some pretty well established expectations: in a first-person shooter the left analogue stick tends to drive the direction of the protagonist, the right deals with finer movements, such as head direction. Also certain buttons tend to do the same things across different games, e.g., X, Y, A and B buttons on the Xbox and the shapes on the Playstation controller.

The last time we remember such a blank canvas for interactive design was in the early days of the internet. Pages were colourful, flashing and had different fonts. Standards, such as top- and left-hand navigation were not in place, and often people used patterned backgrounds to their pages, which made it hard to read the writing on top. Sites were exciting, but hard to use. However, gradually, over the years, the fun of the web remained, but design conventions were derived from the sites that people found easiest to use (and consequently used most).

Intuitive expectations of use

Here are the main findings from the research we performed, looking at the most intuitive uses for the different features of the Wiimote and Nunchuck.

In general, there is a tendency among users to assume that the two elements of the controls are the same as a regular controller, but chopped in half; the nunchuck is the left side of a controller; the Wiimote the right. It's as if despite the conscious feeling that the controls are completely revolutionary, the user's motor memory is not fooled by the hype! It treats them the same as if they were a 'normal' controller.

The assumption that this is a 'normal' orthodox controller manifests itself in the kind of functions users expect the buttons to do. It's only where there are newer features, like movement sensing, or where the right analogue stick is missing, that users can be a little bewildered.

1. **Nunchuck stick**: to most users it is the left analogue stick from any orthodox controller. Therefore, they expect it to be the fundamental means of navigation of the protagonist; forward, back, left and right.

2. **Nunchuck trigger**: Again, users expect this to work in the same way as on the left side of an orthodox controller. To that extent typical actions that work well with it are the brake on a vehicle, defensive shield blocks, secondary weapon fire, etc.

3. **Nunchuck movement:** Often the left-hand side of an orthodox controller is concerned with the more global, larger movements such as body movement, vehicle control, etc, whereas the right hand side is concerned with finer details such as head movement, looking direction, sword work, gun direction etc. We find that Wii games that build on this existing distinction often work well for users. For example, Link's body movements in Zelda are primarily controlled with the nunchuck's stick, and wiggling the nunchuck can lead to large scale attacks (spins, flips, jumps, etc). Again, building on the existing knowledge of how users expect the controls to work leads to easier, more intuitive learning of the Wiimote controls.

4. **Wiimote trigger:** This is another key control feature. As such, users have a pretty clear expectation of what sort of actions it should do, such as being the primary fire or attack mechanism, or accelerator. These kinds of expectations are so ingrained that any substantial variation in their function takes users a time to get used to. When learning how to play a game, this can lead to enough initial frustration to turn users off or make them give up.

5. **Wiimote cross:** The cross harks back to the 'good old days', when it once functioned as a primary control mechanism. However, its position on the Wiimote prevents it from being used as such, unless the Wiimote is used horizontally. It lends itself to be a good secondary form of HUD or inventory access mechanism, possibly also for cycling through weaponry. However, its

distance from the natural resting position of the user's hand means that if it is needed in the heat of the moment, it may be too far to reach comfortably, and would be best used during moments of pause between high action gameplay.

6. **'A' button:** The 'A' button is where one might expect the old analogue stick to sit. Assuming that the functions of the analogue stick can be intuitively replicated using the motion sensing and infrared of the controller, the 'A' button can work in a couple of main ways:

   First, it functions as the primary confirmation button; a press of 'A' signals that you want to respond positively to an option.

   Second, it opens up a second layer of interactivity with the Wiimote motion sensing: The 'A' button is in the position that users associate with the right analogue stick and as such their motor memory is already primed to use it in the same way that they are now using the motion sensors on the Wiimote: waving their hand around to generate small scale character movements (sword control, etc). From experience, we expect users to be able to perform two sets of functions easily: one when using the Wiimote's movement sensors without pressing 'A' and one with pressing 'A'. This should double the number of potential actions that the Wiimote can create.

7. **'+' '-' and home buttons:** The home button is a universal and consistent pause button. The position of the plus and minus buttons on the control, despite a central location, indicates that they are ideal for use when the game action is not overwhelming, as they require the user to move from their hand's resting position. As with the Wiimote cross, users feel they work best as inventory-style mechanisms.

8. **Speaker:** The speaker, though quite small and tinny, is popular with research participants. It is a small element, but it allows a surprising increase in the level of interactivity that users feel with a game. There are two main types of game sounds that we have noticed working well with users:

   First there are those that help to differentiate between whose turn it is in a multiplayer game (e.g., the 'ping' noise in Wii Sports bowling).

   Second, there are sounds that help to create a 3D localisation of sounds, with noises close to the user, such as sword swipes, or guns reloading, working well alongside the sounds of the game environment, emanating from the TV.

9. **'1' and '2' buttons:** When the Wiimote is held in a vertical position, the '1' and '2' buttons are difficult to use, similar to the cross and the plus and minus buttons. This suggests that they are again secondary to the main game playing control mechanisms, and more suitable for inventory selection, etc. However, when held horizontally, the buttons form the basis of the classic SNES controller, along with the cross as the direction pad.

10. **& 11. Wiimote movement and infrared:** The absence of the right analogue stick is quite dramatic, especially in terms of the amount of influence the right stick has in non-Wii games. However, the stick's uses are often those that are perfectly suited to the use of the Wiimote's infrared beam and movement sensors.

    For example, the right analogue stick on an orthodox controller is often charged with moving camera angles, altering the protagonist's field of vision, aiming, and multiple smaller actions

(smaller than physically moving the protagonist around), such as wielding a sword or other weapon.

These are all features that the motion sensors, accelerometers and infrared beam are potentially even better suited to performing than the stick, and seem to be more intuitive according to our users (hence the lack of the inverted aiming problem that dogs orthodox controls in first person games). Therefore, although the user's previous mental model of using the right thumb stick on non-Wii games does not apply with the Wiimote, the intuitiveness of the motion sensing easily allows them to grasp the new controls.

Reflecting the early internet's desire to show off all that it could do, there may be a tendency amongst developers to try and show off what the Wiimote can do without considering what really works for the end user. User feedback on Red Steel seems to illustrate this: the user opens doors by wiggling the nunchuck up and down. It certainly shows off the movement sensor in the Nunchuck, but it's not as intuitive or as quick as pressing a button. Designers need to focus on what is the most intuitive way of using the nunchuck to allow users to do something, not on how the features of the controller can be worked into the game.

There are more subtleties than simply assigning a button or movement to create an action, although that is important. Responsiveness to movement and a gradation of responses to different severities of movements, are vital to give the user the precision and accuracy that a controller requires. In fact, users are often pleasantly surprised by how accurately the Wiimote can replicate their actions.

Also, the frequency that users are expected to perform an action and the importance of the action should help to determine what elements of the Wiimote are assigned; if it's infrequent and not integral to gameplay (e.g., opening a door) it shouldn't be assigned to an important central control function such as the global movements of the Nunchuck (users also feel that the Nunchuck, as part of their left-hand controls, should be concerned with larger-scale movements). Designers also need to balance the frequency of likely use with the accessibility of the button – if it's used frequently, it needs to be one of the central control features.

Finally, combinations of button presses and handset movements is an area that requires further research, to see what particular controls feel intuitive in particular situations. The multiple potential combinations of movements and buttons lead to many possibilities. Individually tailored research on specific mechanisms in particular game contexts, throughout the development process, is essential to understand which works for users in each situation.
This is an introductory guide, based on the available evidence we have from recent research. We hope it helps to guide general design decisions. As always, the best way to understand if a mechanism is intuitive and comfortable with users is to ask them during the development process and incorporate iterative changes throughout.

About PlayableGames

PlayableGames (formerly SGR), a division of ExperienceLab, has been studying (and playing) games for years. PlayableGames consists of a team of highly experienced gamers and user experience researchers, a team that shapes gaming experiences for console manufacturers and publishers in the UK and abroad.

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