The Technical, Social, and Cultural Affordances of Intellivision

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Keywords
Intellivision, Atari, game history, affordances, constraints, platforms, platform studies, marketing, time, labor, legal, licensing

INTRODUCTION
The toy company Mattel produced the Intellivision system from 1979 to 1984, the main competitor of the better-known Atari VCS. Intellivision was a more sophisticated machine than the Atari VCS and contains unique components that influenced the games produced for the system, including the first onboard operating system to aid game design (the EXEC), a unique graphics chip called the Standard Television Interface Chip (STIC), and even a voice synthesizer extension, Intellivoice (Mason 2014). Like other game systems, these technological components shaped the aesthetics and gameplay of Intellivision games. Yet the technical functioning of the hardware and software were not the only constraints that productively shaped Intellivision games and applications produced for the platform. Based on extensive interviews and archival research, we expand beyond the technical perspective as a form of productive constraint, uncovering social, cultural, and institutional forms of affordance and constraint that shaped the Intellivision platform (Gibson 1977).

In their book *Racing the Beam*, Nick Montfort and Ian Bogost defined platform studies as "the investigation of underlying computing systems and how they enable, constrain, shape, and support the creative work that is done on them" (vii). In platform studies, constraint is often equated with material constraint. We share an appreciation for the deep and often unexpected ways that materiality can act as constraint, from the limits of cartridge memory to the workings of television sets, from game code to hardware chips. However, in order to avoid a depth ontology that treats "the platform as the 'base' or most fundamental level" (Leorke 2012:259; Altice, 2015:193) we advance a perspectival approach that expands the scope of analyzing creative constraints. First, we argue that other forms of constraint—particularly those linked to time, legacy, licensing, and marketing—not only intersected with material constraint but were often

Proceedings of DiGRA 2020

experienced as more consequential (and more productive) than material constraint. Second, these forms of "constraint" were often experienced as sources of inspiration and creativity rather than constraint as such (Norman 2013; Bogost 2016).

Thus, while we examine technical constraints of Intellivision, particular attention is given to how these technical aspects intersect with other institutional, social, and cultural constraints that impacted game development. Our argument expands on recent work in platform studies that investigates how social, cultural, and economic factors shape technologies (Apperley and Jayemane, 2012; Jones and Thiruvathukal 2012; Gazzard 2016; Arsenault 2017; Mailland and Driscoll 2017; Therrien 2019). Yet our work focuses on how these contexts shaped the games produced, not only the underlying hardware of the platform.

For example, we analyze *temporal pressures* that shaped Intellivision games such as *B-17 Bomber* and *Maze-A-Tron*. *Maze-A-Tron*, for instance, contains a number of "bugs" that were turned into features through an institutional process at Mattel where managers decided that such "bugs" could be explained and included in the manuals as features in order to not delay production. Crucial to understanding this impact of temporal constraint is that in during the "second generation" period (the first video game systems to use cartridges), over 80% of sales took place during the Christmas season, and thus the entire game design process was articulated through a temporal cycle quite different from the contemporary period. In terms of *legacy*, we analyze how inherited code significantly shaped Intellivision games including *Space Hawk* (which was developed from the code of *Astrosmash* and which also employed an inherited "scrolling" module that left its mark on the aesthetics of the game). In terms of *licensing*, we explain how professional sports licenses shaped many Intellivision sports games such as *Major League Baseball*, *NBA Basketball*, and *NHL Hockey*, requiring a strict standard of realism in order to authentically simulate various sports. Licenses also determined the look and gameplay of titles such as *Kool-Aid Man* and *Masters of the Universe: The Power of He-Man*. *Kool-Aid Man* was designed with a strict set of rules that determined what could (and what could not) appear within the game. For example, the character Kool-Aid Man could not die and had to appear full of liquid. In terms of *marketing*, Mattel's extensive consumer research shaped game production beyond the use of licenses, for example, by determining that the primary demographic of players that they sought were younger males and that particular gameplay themes and mechanics were appealing to these players. Our research reveals a complex interplay between marketing and design, where marketing had a strong influence on some games (e.g. when licenses were involved) while at other times managers protected programmers from this influence in order to provide them with more freedom of expression. While the technical platform inevitably constrained the games that we discuss, the *platform culture* and institutional infrastructure that emerged around Intellivision had an equally powerful effect on commodity production at Mattel Electronics.

Our analysis of Intellivision is based on an extensive data set including thousands of documents from institutional, corporate, and personal employee archives that individuals have shared with us. These documents include Mattel Electronics' marketing research, game code, corporate memos, test reports, legal and court documents, and so on. In addition, we have interviewed over 125 individuals who worked on Intellivision including engineers, programmers, managers, executives, lawyers, marketers, QA testers, and more. Building on this unprecedented empirical base, our analysis shows how an expansive understanding of technical, cultural, and social constraints can provide a more robust image of how a technical platform and its institutional contexts shape the commodities that appear on a platform. Dynamics established during this period continue to shape videogames and digital culture more

broadly to this day, and our reframing of affordances and productive constraints beyond the technical will provide insights into contemporary debates concerning the relationship between technology and society.

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