Chapter 18: Trans- and intra- apps: innovating the app market and use

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Abstract

This chapter focuses on cross- or inter-media experiences facilitated by children's apps and the ways in which the so-called "transmedia apps" could enrich children's learning experiences. Against the backdrop of some worrying commercialisation and personalisation trends, some exciting possibilities with virtual and augmented reality apps are provided. Suggestions for future design of transmedia are outlined with concrete examples and current evidence.

Keywords: transmedia, app in purchases, augmented reality, virtual reality, future models, legislation.

Introduction

Children's apps are software programmes designed to facilitate a range of experiences, ranging from simple phonics activities to more complex open-ended creative art activities. The current iOS app market contains more than 80 000 apps offered in the educational category, with new apps added on an everyday basis. The big volume of apps makes it hard for parents and teachers to navigate the market and choose the right app for their child (Chiong & Shuler, 2010) and for app designers to identify and maintain their position in the market (Khaddage, Lattemann, & Acosta-Díaz, 2014). In this chapter, I argue that trans- and intra- apps which bring several app experiences together in a variety of combinations, could provide a new basis for conceptualising and innovating children's app market.

As the prefix "trans" indicates, transmedia refers to cross- or inter-media experiences, which extend a given story or narrative across various types of media. In their report "T is for Transmedia", Herr-Stephenson, Alper & Reilly (2013) define transmedia as "any combination of relationships that might exist between the various texts (analog or digital) that constitute a contemporary entertainment media experience" (p.2). A typical example would be the Harry Potter franchise which includes a series of Harry Potter apps for fans to download in addition to reading the Harry Potter books (or listening to the audio-books), watching the films, playing with the toys, computer games, or Lego construction kits. An intra-app, on the other hand, is an app which aggregates various experiences within one software programme, offering a seamless and integrated experience. A basic example of an intra-media app experience is an in-app purchase which wraps an app with several layers of engagement, gradually available to the user.

In this chapter, I use the concept of transmedia and examples of intra-app experiences to examine the present and possible future app models and their potential for children's learning. The trans- and intra-media models are useful concepts because they consider not only what is currently available, but also what lies behind many emerging practices of app engagement and the larger landscape of children's software programs.

I provide some guiding points for future research seeking to develop a better understanding of apps' potential to nurture cross-media and richer learning experiences and outline ways which may be used for identifying pedagogically sound use of intra- and inter-media apps in the classroom and at home. I argue that intra-and inter-media apps can endow children's experiences with a new layer of meaning and offer children further entry points into the rich worlds that surround stories. Moreover, balanced trans- and intra-media app experiences can provide a useful spur to necessary innovation in the currently saturated app market. However, for transmedia apps to reach their potential, careful attention needs to be paid to their commercialisation purposes, data use and personalisation policies. Young children are largely unaware of the commercial intent of the apps they engage with (see www.commercialfreechildhood.org/) and it is important that app designers, researchers, parents and teachers (i.e. adults who influence children's choices of apps) are fully aware of the potential benefits as well as pitfalls of trans/ and intra-media apps. As such, the chapter might be a useful reference for several stakeholders who are looking for an innovative edge with children's apps.

Theoretical framework

As Saljo explains in the first chapter, key learning theories (such as behaviourist theory or cognitive theory of learning) do not include technologies in their core conceptualisations. This is understandable given that these theories were developed at a time

when technologies were not central to a child's learning experience. With the advent of new digital tools, however, several new formulations of learning (see Verhagen, 2006) have emerged, which specifically address the learning opportunities with technologies.

A useful framework for understanding how inter- and intra- app experiences may contribute to children's learning is Connectivism. Connectivisim is characterised with eight key principles:

> • Learning and knowledge rests in diversity of opinions;
>
> • Learning is a process of connecting specialized nodes or information sources;
>
> • Learning may reside in non-human appliances;
>
> • Capacity to know more is more critical than what is currently known;
>
> • Nurturing and maintaining connections is needed to facilitate continual learning;
>
> • Ability to see connections between fields, ideas, and concepts is a core skill;
>
> • Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities;
>
> • Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision.
>
> (Siemens, 2004, p.4)

As the name reveals, "connection" is a key concept in the framework, which is identified and explored as the basis of all learning. Although not a learning theory in and of its own right (Kopp & Hill, 2008), connectivism provides some useful concepts in relation to the four key principles of 21st century learning: autonomy, connectedness, diversity, and openness (Tschofen & Mackness, 2012). Unlike other new forms of learning such as Massive Open Online Courses, most apps are designed to foster a remarkably old-fashioned way of learning: the learning experience is limited to the app and often closed to wider engagement (users need to exit the app to connect to wider social networks); emphasis is placed on individual learning and little diversity in the app production and content of children's apps (see Garofoli, 2014). What would happen if apps were designed according to the theoretical principle of connectivity? I consider a few key potential learning benefits.

Learning benefits of intra- and inter-media apps

Multiple intelligences. In a paper co-produced by the USC Annenberg Innovation Lab and the Joan Ganz Cooney Center, Herr-Stephenson, Alper & Reilly (2014) provide a guidebook to transmedia in the lives of children age 5-11 and outline its applications to storytelling, play, and learning. The key concept the authors present as relevant for learning is that transmedia supports the expression of multiple literacies and intelligences: "transmedia engages multiple literacies, including textual, visual, and media literacies, as well as multiple intelligences" (Herr-Stephenson, Alper & Reilly, 2014, p.2). Multiple intelligences is a psychological theory about the mind, originally developed by Gardner (2011) which identified seven distinct intelligences: linguistic, logical-mathematical, musical, bodily-kinesthetic, spatial, interpersonal and intrapersonal. Just how exactly could transmedia experiences support multiple intelligences is not yet known, but we could hypothesise that the possibility to engage with texts and narratives in various modes (textual, visual, audio, interactive) allow students to use multiple intelligences. For instance, the Frozen story is

available to children as a film (which children can just sit and watch), as a picturebook (which children can enjoy looking at and emerging readers explore the simple sentences) and as an interactive story app, with which children can create their own snow globes and re-create scenes from the film with frosty drawing tools. As such, the app can provide different entry points to the story world of Frozen, focusing on different elements of the story, different points in the plot timeline, or engage children in the story from different perspectives. Children can respond by producing their own drawings and simple games. While a single app is unlikely to provide opportunities for all the different kinds of intelligences, cross-media apps provide more opportunities through multiple channels of engagement. These are more aligned with the multiple intelligences than static print-based materials, which often privilege the linguistic expression of knowledge over the visceral (physical) and, material (see Bourdieu, 1989; Foucault, 1982; Latour, 1987 and Wohlwend & Russell in this Volume).

Agency. Transmedia has been proposed to attribute a unique potential to innovate children's engagement with texts and create a symbiosis between agentic involvement and crossmedia activity (Jenkins, 2001; 2003). Children's agentic involvement is an important concept in the 21st century: as Kress (2005) reminds us, with new media, children are not only represented but also interactive participants in a narrative. While with static print books readers were positioned as represented characters with pre-determined characteristics, with apps and other digital tools, children can interact with the characters in the book or game; they can customise the narrative or personalise the story characters/ avatars. This gives children a sense of agency, achievement and ownership of the story which is important for readers' motivation and pleasure of reading (cf Appleyard, 1990; Rothbauer, 2004).

Importantly, the emphasis in transmedia experiences is on enriching and enhancing a given story/ narrative, avoiding replication. This means that a good transmedia

experience provides users with various depictions and various media treatments of the same content. The focus on the narrative means that the centre of experience is the story rather than the format in which it is delivered. The transmedia theory thus aligns with the contemporary perceptions of platform-agnostic media engagement: children's engagement with stories in any format (digital, print, interactive or static), is part of the 21st century landscape (Kucirkova, 2014a). For instance, with various apps based around the Cinderella story, children can make the story characters move, choose the colours of Cinderella's dress, record their own voices to tell the story and share it remotely with their friends. This is different from the previous engagement possibilities with a Cinderella book or film. Each medium adds a different layer to the story and user experience, which is an attractive concept in an era characterised by a multitude of reading devices (eg., Kobo, Kindle, Nook, iPads).

Collaboration. Yelland in Chapter Five outlines the importance of collaboration for children's development of 21st century skills. In theory, and emerging evidence supports this assumption, intra- and inter-media experiences support connections among stories and other readers, which in turn, supports collaboration and creation of new content (see Herr-Stephenson, Alper & Reilly, 2014). A frequently cited example of educational transmedia is the digital novel called "Inanimate Alice". Fleming (2013) outlines how Inanimate Alice supports collaboration in classrooms, with readers positioned as direct participants, who co-construct the story in multiple ways (including games, puzzles, new stories, story reviews). The novel is highly interactive, enabling readers to take the story to another level, with several supporting mechanisms along the way (eg possibility to remake photostory pages, screenshots and scripts). Teachers can further encourage co-creation of the story with several worksheet assets, music tracks and the comic book art provided by the Inanimate Alice producers (Fleming, 2013). Based on her experience of using Inanimate Alice in classrooms and in libraries as a school librarian, Fleming (2013) argues that the highly collaborative

nature of Inanimate Alice activities can foster children's empathy, and if implemented well, it can, together with other transmedia learning, connect "learners around the globe, and therefore leveraging the power of the collective" (p.377).

Developmental appropriateness of trans- and intra-media

However, transmedia may not work for all children, there are important individual differences in children's responses to apps (ses Radesky and Zuckerman, Chapter Two). As Pietschmann, Volkel & Ohler (2014) argue, children, especially younger children, who do not have the adequate cognitive, emotional, and moral capacity, may not derive the benefits propagated by transmedia enthusiasts. By drawing on developmental theories by Piaget (1953) and Perner (1993), Pietschmann, Volkel & Ohler (2014) point out that for young children (under the age of two), connected story experiences don't make much sense as young children can only process some basic features of the content such as colors, shapes, and sounds but cannot follow complex and connected narratives. Indeed, the fact that children acquire abilities sequentially is also recognised in the current guidance around the use of digital media with young children, which recommends that for children under the age of two, the use of 2D screens should be limited as they are unlikely to benefit from the content portrayed in this format (APA, 2014).

Thus far, the evidence on developmental appropriateness of children's apps, including intra- and inter-media apps, is mixed, with no longitudinal data on key developmental milestones and learning abilities. What remains as a fact is that intra- and inter- media apps are an attractive concept for app producers, as they both represent an opportunity to expand the audience and market, and thus more opportunity for increased profit (Sharp, 2012).

How do intra- and inter-media apps fit the current app business models?

The commercial side of intra- and inter-apps

Inter-media apps. A typical model of intra-apps for large entertainment sources is to produce an app as an add-on to an existing suite of products. For smaller app publishers, the process is often reverse, with the production of an app first, followed by a suite of related products. For example, the award-winning app producer Toca Boca™, started with apps and as the success of the company grew, added to their list of products t-shirts, toys and socks featuring characters from their apps.

Producing transmedia apps is an attractive option for app producers as it represents an opportunity for diversifying their product portfolio and income streams. It is well known that developing an app is a costly endeavour, with an app production costs amounting to cca $10,000-70,000. Yet, the revenue generated through app purchase is low: an average app costs around $3 which means that app producers need to rely on large number of downloads to cover their costs of production. This makes it difficult for small app producers to survive in the app market. The other difficulty is that the app market is currently over-saturated with children's educational apps, with more than 80 000 (as of 2015) marketed as educational for young children. Children's app producers are therefore looking for a more sustainable and sound business model.

App producers with a suite of apps (particularly those who produce storyapps with a sequel of titles) often operate on the subscription model, charging the customer a regular, recurring fee to use an app. Many parents like this model for children's storyapps as it means that they get new titles on a regular basis, without the need to look for them in the

App store. In addition to subscription models, the so-called "app bundles" have become available sthe launch of iOS8. App bundles enable app developers to sell several applications together, at a discounted rate. This model works well for larger app developers who can bundle various apps and thus increase their marketing strategy.

Intra-media apps. Intra- media apps are still relatively new, but several examples exist for connecting apps within each other rather than across media (or apps). App meshing is a process whereby app producers embed hyperlinks into an app or digital book. For example, at the end of the "what is that" ibook, there is a hyperlink to the Our Story app, which encourages users to create their own digital book, after they have read the 'What is That' story. Such app meshing can be a viable option for app producers seeking to build partnerships with other app companies and thus increase their customer base and connect users' experiences via distinct apps.

Another intra-media option is in-app purchasing. In- app purchases are features within apps, which can be unlocked, if the user pays a fee. For instance, with a free children's app, users can remove ads with an in-app purchase or they can buy additional content, 'skip a level to in-game currency that can be used to outfit a character, speed things up, or decorate a room' (https://www.commonsensemedia.org/blog/8-ways-to-save-and-spend-on-free-apps). Such an opt-in purchasing process is a popular model with adult digital games but its use with children's apps has come under a lot of criticism.

In the early days of children's apps, there was no legislation and little awareness of the various, often hidden, possibilities of in-app purchase. It did not last long that several cases appeared in the newspapers of parents shocked that they discovered their child had spent hundreds of dollars for additional features within downloaded apps. Both Apple and Google have profited by marketing free or low-cost apps to children and permitting them to

easily purchase in-app features, without incorporating reasonable controls (e.g., the entry of a password, locking the phone etc.). Many parents took legal action against the app producers and thus far, Apple had to refund £32.5 m and Google £11.6m to settle formal complaints over unauthorised in-app purchases by children. Despite these legal settlements, in-app purchasing is still available for several children's apps and its availability depends on the country's legislation. In the UK, the Office of Fair Trading has issued guidelines in 2014 which state app publishers need to provide up-front information about the costs and only accept payment if the account holder provides informed consent. In other countries, for example Canada, no formal legislation exists, although several guidelines have been issued, including the 'Ethical Framework and Best Practice Review of the children's digital industry in Ontario' by Kids Media Centre, Canada.

One should bear in mind that app developers have little say in how in-app purchases are handled, Apple and Google control "the customer relationship when in-app purchases are made" (http://www.informationweek.com/mobile/5-tips-for-building-subscription-based-mobile-apps/d/d-id/1111625?). In-app purchases are thus an example of how intra-media apps can be connected to a double concern of security and commercial exploitation.

Concerns around intra- and inter-media apps

When app producers adopt personalised transmedia as a business model for children's apps, they need to be very careful about secure management of children's personal data and transparent pricing models. Several personalisation techniques exist to connect intra- and inter-media apps, with 31% of retailers and brands stating personalisation as one of the top three priorities for 2015. This means that if apps become regular parts of children's media experiences, they become another aspect of the user's data trial that can provide

business opportunities. Given that intra- and inter-media apps can engage children at various ages and via various means, retailers can get data on young children's *patterns* of engagement (not just one single activity, which means that developers and network producers can easily build a complex picture of children's needs and preferences. That is sure to sound the alarm bells in any parent and has been criticised for contributing to the increased commercialisation of childhood (see http://www.commercialfreechildhood.org/).

An update to the Children's Online Privacy Protection Act of 1998 in July 2013, requires all US operators of mobile apps 'to provide notice and obtain parent's consent before collecting personal information from children under the age of 13' (http://thedma.org/wp-content/uploads/COPPA-rule-sept2013.pdf). Similar laws are in place in other Western countries, but adults should bear in mind that not all providers comply with the law and some are still knowingly collecting data from children including their names and e-mail addresses.

The difficulty of intra- and inter-media apps is that it is caught between two worlds: that of sound learning models accompanied by almost philosophical academic rhetoric, and that of a tool to structure a business model. What are the possibilities of intra- and inter-media apps for educational purposes?

Intra- and inter-media apps in education

Fleming (2013, p. 371) asserts that: "Although transmedia can claim considerable success in the entertainment world, as well as in aspects of business generally, it can be argued that the real roots of transmedia in fact lie in education, as teachers have long sought out diverse resources and strategies to reach and engage their students". The current educational app market is dominated by apps produced for single and linear experiences (see Rowsell & Wohlwend, this Volume). Teachers often engage with their students in experiences where a narrative is depicted in a variety of resources and artifacts (eg books,

toys, cartoons, films and/or games) and which carries links to several interconnected curriculum subjects. Apps could be part of such connections and this section outlines the main ways of effectively integrating intra- and inter-media apps into the classroom.

App smashing

Creative teachers are often the best innovators and there are many online reports, blogs and forms of anecdotal evidence show how teachers have engaged in app "smashing". App smahisng is "is the process of using multiple apps to create projects or complete tasks" (www. k12technology.weebly.com/app-smashing.html) or in other words, using siloed, independent apps in groups. Teachers can group apps by creating app folders on students' devices or using a group of apps for a specific activity. Teachers can also "smash" a writing app with another app for video recording to extend a text-production activity. This allows children to explore various literacy options and express their ideas in various ways and produce a richer final product.

When looking for more seamless and sophisticated app smashing, mobile device management companies, such as AirWatch™, provide solutions (e.g., the "Teacher Tools" http://www.air-watch.com/industries/teacher-tools/) with which teachers can populate specific iPads with specific content. For instance, teachers can select a group of tablets for which they push apps related to literacy skills and add to these a bank of other online resources, including a selection of pictures, pdf files or website links. As such, apps become part of a digital customised classroom environment, enriching students' learning journeys.

The practice of app smashing or app linking, is a recommended technique for teachers implementing apps and digital books in their classrooms. Based on extensive observations of classroom use of iPads, Brueck and Roskos (see this Volume) developed guidance for teachers to use digital books, part of which is the recommendation to combine

apps to increase a child's educational experience. The framework contains the following recommendations: (1) Know your device; (2) Know your ebook; (3) Establish routines; (4) Link apps together (emphasis added by author) and (5) Be persistent**.**

As more and more public schools are using tablets and iPads, more and more possibilities for collective app smashing emerge. However, to be able to effectively combine apps, teachers need to have a good knowledge of what apps to choose in the first place. With 10 000s apps advertised as educational, it takes time and considerable effort to find the right app. What strategies can teachers use to streamline the app search process?

Choosing educational apps for the classroom

There are two main search strategies for educational apps. Teachers can either become active in the search process and search for apps in the iTunes store (for iOS based devices such as iPads, iPhones, and the iPod touch) or Googlemarket store for Google devices. Alternatively, they can search for apps directly with Google search: with app indexing introduced in May 2015, teachers can search for an app and install it to their device straight away (https://developers.google.com/app-indexing/).

The second strategy is to choose an app reviewed by other users or expert groups. There are several third-party review sites, for example, Common Sense Media Graphite https://www.graphite.org/) and Children's Technology Review (www.childrenstech.com) are great sites for teachers who are looking for apps and tips for how to implement them in the classroom. Also, teachers with apps (www.teacherswithapps.com) provide periodically updated tips for the best apps in the classroom.

To be able to apply other users' reviews, or expert reviews to their own context, teachers need some strategies to sort the array. Working with several groups of UK teachers had led me to the formulation (Kucirkova, 2014b) of some rules of thumb in helping teachers decide which apps to use:

- The app needs to be aligned with the specific activity, skill or experience you aim to foster
- The app needs to enrich the activity you have in mind
- Open-ended apps offer more opportunities for children's own creativity and exploration than template-based ones
- Apps which support shared engagement with others can foster social skills
- Discuss your choices with other parents, teachers and the children themselves.
- Consider the added value of the app's use for the offline version of the same activity

App smashing can ensure that children's experiences are less dictated by commercial interests and more by what their educators (teachers and parents) perceive as important for their development. Teachers' direct involvement in facilitating intra- and inter-app experiences illustrates a possible future direction for children's apps.

Future models of apps

Most children's apps operate as a single-app model, offering intense but short forms of engagement. Such a linear process of engagement has been criticised for negatively impacting young children's mentality, building false expectations around life experiences and

risk-taking (Gardner & Davis, 2013). Increasingly, however, new, brain-inspired models of computing, use software functioning of which is not linear but parallel and often serendipitous. It is foreseeable that the app design will move towards this direction, offering users a sustained, more complex experience, inspired by brain-computing models. What could future app models look like?

Augmented reality apps. Augmented Reality is "a type of virtual reality that aims to duplicate the world's environment in a computer" (www.webopedia.com). Augmented reality apps allow children to engage with a digital activity by overlaying that experience on a real object. For example with the Zoo Burst™ app, children can experience their story as it "jumps out" of the paper and interact with it. With Smart Car™ from Thames & Kosmos, digital content can be unlocked using physical toys (the toy car comes with augmented reality code cards which create a virtual city on the tablet screen). Such augmented reality apps can bridge traditional and digital experiences in an unprecedented way, offering children immersive experience.

The combination of 3D printing with apps is another way to enhance children's experience. At the moment, this is happening through third-party providers, for example Crayon Creatures™ can turn children's drawings into sculptures by printing the drawings with 3D Printing technology. The current process involves the adult sending the artwork to the printers and Crayon Creatures shipping the final artefact back. It is possible, however, that home-based 3D printing connected to apps will become more available and affordable in the future, including for the children's market (see the Printeer™ iPad app kick-starter project).

So that these connections are meaningful and engaging for young children, it is likely that the future of apps will see increased use of personalised recommendation systems.

Apps with increased personalisation. Personalised recommendation systems are systems which can predict content a user might be interested in, by drawing on information on the user's past history of engagement and on the user's past activity, stored under the user's profile. Recommendation systems can be helpful for offering additional options for intra- and inter-media apps (especially if users have insufficient knowledge and experience to know which other app might be of interest to them) and they can also simplify the search process for apps of similar content (see Shinde, & Kulkarni, 2011). As the recommendation systems become more robust and able to provide content-based, collaborative and hybrid recommendations (De Campos, Fernández-Luna, & Rueda-Morales, 2010), the Internet is becoming 'more seamless, more pervasive, personal and even predictive'(Goodwin, 2015, online). It is possible that the strategies currently available for app smashing and meshing, will be endowed with intelligent recommendation systems in the future, so that children's learning experiences are more personal and more relevant to their individual profiles.

Imagine, for example, that a user downloads an app for simple literacy skills (eg the ABC spy). After the user has played with the app, s/he would get a personalised recommendation for another app, based on their level of engagement with the previous app. The TinkRbook™ developed at MiT can track the length and length of users' engagement on the back end. The future may see more apps with embedded tracking software (see Falloon's chapter in this Volume) which would tailor the content to individual users, pushing personalised recommendations for apps, all within a unified intra-media app package.

In all these developments, it is important to remember that as technology gets more sophisticated, the human interaction around technology needs to be further developed too. As numerous technology evaluation projects remind us (e.g., Slavin, Lake, Chambers, Cheung, & Davis, 2009; Torgerson et al., 2004), it is the pedagogy contextualizing the use of

technologies (whether these are tablets, laptops or interactive whiteboards in the classroom), rather than the device per se, that makes a difference to children's learning. It follows that personalised recommendation systems supporting future intra- and inter-media projects need to be informed by the needs and preferences not only of automatically generated data but also that actively input by the users. Parents and teachers know the children's needs and preferences best, and their efforts to personalise their children's education need to be accompanied by more capacity building and training programs (see Archer et al., 2014 for a similar argument in relation to the well-trained and supported teacher programmes with ICT).

It is also likely that in the future, there will be more programmes personalised according to children's own choices, with more embedded possibilities for children to inform products and activities designed for them. For instance, in addition to textual input, voice-recognition software programmes embedded in children's toys (eg Hello Barbie, see http://www.theregister.co.uk/2015/02/19/hello_barbie/) are likely to break through further on the global market.

Virtual reality apps for children. Marsh and Yamada-Rice explained the difference between virtual and augmented reality in Chapter Fifteen when describing in detail children's interactions with augmented reality apps. At the time of writing this chapter, virtual reality software is only emerging on the market, with a focus on digital games and improved communication options for adults and teenagers rather than young children. Some pioneering work in this area has been undertaken by groups of technology enthusiasts who aim to bring fun experiences to hospitalised children (e.g., the Osmos Academy in Canada), or teachers who used virtual reality software to connect informal and formal learning experiences in schools (e.g., enabling children a virtual tour of a museum from the classroom). While the development of enriching and educational narratives specifically designed for virtual learning environments will take a few more years, it is clear that virtual

reality apps will become part of the transmedia landscape, taking children to literally new dimensions.

To ensure that future developments in this area proceed in an ethical and integral way, it is essential for technology to transparently model and demonstrate how personalisation systems work and how chidren's data are used to provide a more effective user's experience. Importantly, it is essential that in all these efforts, intra- and inter-media experiences are provided in conjunction with offline experiences, mediated by adults, children's peers and community partners.

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