

Flagship Battle: Google's Pixel vs Apple's iPhone 7

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Executive Summary

The objective of this investigation was to determine which flagship smartphone was the better choice for purchase for an average consumer.

This report involved both primary and secondary research methods. The primary research was done at a mobile carrier shop in downtown Ottawa, Canada, and was an unbiased testing of phone ergonomics. The secondary research included reviews from trusted device-review websites, as well as a specifications website.

The report was divided into four categories: technical specifications, exclusive functionalities, price and affordability, and phone ergonomics. For technical specifications, the result was mixed depending on user preference but leaned towards the iPhone in terms of processing power and safety. For exclusive functions, the iPhone 7 holds more functions unique to its handset and product family, mostly due to its closed-source software. As for price and affordability, the devices are identical in price upfront, but carriers do not offer a subsidy for the iPhone, whereas they do for the Pixel, making the device more affordable if one does not wish to spend a lump sum. Finally, in ergonomics, the iPhone 7 outweighed the Pixel in nearly every category, and felt like a better-designed handset.

In conclusion, the iPhone 7 was the better choice for the average consumer, as it is more powerful through the inspection of its internal components, as well as more comfortable in the hand. If the user is content with a lack of subsidization through carriers, then the iPhone 7 is the clear choice.

Introduction

The iPhone was first announced at Apple's worldwide Developer Conference (WWDC) in 2007 by Steve Jobs. Compared to mobile phones at the time, such as the Nokia E52, Moto Q, or the Palm Trēo, Jobs announced that Apple's new phone was more intelligent and provided functionality that was not found in other devices (mipodstuff, 2011).

Upon release, the iPhone was set at a staggering \$599 USD for a model with 8 gigabytes (GB) of storage. Despite the cost, by September 2007, the tech giant had sold over a million iPhones. Since then, Apple has released a new iPhone model every year. Today's iPhone 7 has a similar price point to the original, with the base model starting at \$649 USD.

At Google's developer conference (Google I/O) in January 2010, Google announced the Nexus One. The Nexus lineup were the predecessors to the Pixel series. The original Nexus developers claimed that their device was a "superphone", providing features and uncompromising performance for the average consumer that other phones did not. Later evolving into the Pixel series, the device lineup has become more expensive. The phone now costs \$649 USD, like their Apple counterpart.

From the Nexus One to the Pixel, Google continues to return to the idea of carrier freedom. Carrier freedom is the decision to pull away from mandatory mobile service, and offer a mobile device that can be used on any network band of choice that the hardware supports. While the initial price is significantly higher, "month to month costs are much higher" (AndroidPIT, 2015).

The importance of having a cell phone for calls, multimedia communication, and other 'all-in-one' functionalities has become essential in modern culture. This leads to the demand for flagship phones, which are the brand or manufacturer's best offering. In meeting this demand, the iPhone 7 and Google Pixel were created. The focus of this investigation is to compare the base models of the two phones to determine which is the better choice for the average consumer.

Methodology

To conduct research and investigate to compare these two flagship devices, this report included the technical specifications of the devices, exclusive functionalities, design ergonomics, and price. Price and affordability will only be a metric for comparison as a subsidy comparison, as the base model for both devices are listed in the primary market at the same price (\$649 USD).

This report included primary and secondary research.

Primary research was conducted through a controlled testing phase with both devices in hand. With this method, research bias was minimized through lack of actual ownership of either device. This research was effectively applied to design ergonomics and exclusive functionalities, and was done through in-store demonstrations at a local Rogers store.

Secondary research was conducted through consultation of technical specification websites, such as GSMArena.com.

Technical Specifications

A full technical specifications (specs) page is lengthy and contains every quantifiable value regarding the device. However, knowledge of most of these values are unnecessary to the average consumer. The most important specifications for consumers to note are display size and resolution, central processing unit clock speeds, ingress protection, and battery size.

Display size is measured diagonally in inches from opposite corners of the screen, and contain pixels. The word 'pixel' "is a contraction of the words [Picture Element]" (BestPrintingOnline 2010) and will appear to be a small image tile when magnified. Resolution is measured in horizontal pixels quantity by vertical pixel quantity. Sharpness of an image is then determined by a resolution's respective pixel density, measured in pixels per inch (PPI). Higher PPI will generally provide a sharper and better looking image. It is worth noting that screen size and PPI are inversely proportional if used with a constant resolution, as a larger screen size will yield a lower PPI, and smaller screen will yield a higher PPI.

The iPhone 7 display measures in at 4.7", with a resolution of 750 x 1334 pixels and a PPI of 326. This display resolution is just over the typical high definition (HD) resolution, which measures in at 720 x 1280 pixels. Compared to the Google Pixel's 5" display with a resolution of 1080 x 1920 pixels and 441 PPI density, the iPhone falls short for consumers who enjoy a sharper picture on their displays.

Central processing unit (CPU) clock speed refers to the frequency at which a processing core operates. This frequency is measured in hertz (Hz). For example, a clock speed of 2 gigahertz (GHz) means that there will be 2,000,000,000 clock cycles in one second. With

many devices operating multi-core processors, tasks that take a certain amount of clock cycles can be done in parallel. In general, higher clock speeds equate to faster processing of commands and data, with only slight variance when it comes to processor family (Hardware Secrets 2016).

CPU cores also have a built-in throttling feature. This means that, when the need to cool the cores down, or preserve battery arises, multi-core processors can cap their clock speeds lower than their maximum. In other cases, some cores can shut down to provide a more extreme solution when the device needs to throttle.

The iPhone 7 quad-core CPU clocks in at 2.34 GHz per core (GSMArena, 2016). This impressive and consistent clock speed beats out the Pixel's varying quad-core CPU, which clocks in at 2.15 GHz for two cores, and 1.6 GHz for the other two cores (GSMArena, 2016). This means that, on average, the iPhone 7 will outperform the Pixel in terms of processing power, both pre- and post-throttling.

An Ingress Protection (IP) rating determines the “environmental protection or electrical enclosure of electrical equipment” (EngineeringToolbox, 2016). IP ratings are formatted as IPXY, where X and Y are two numbers. The first number represents protection against solid objects (usually dust and dirt), and ranges from 0-6, where 0 represents no protection, and 6 representing complete protection. The second number represents protection against liquid (usually water), and ranges from 0-8. 0 is no protection, and 8 is complete protection against submersion for long periods of time at a depth of approximately 1.5 meters.

For mobile phones, device safety is an important matter. Higher IP ratings provide peace of mind to consumers, knowing that their device has higher environmental durability. The iPhone 7 is the first of its kind to sport an IP rating, certified for IP67 (GSMArena, 2016). This means that the iPhone 7 has complete protection against dirt, dust, and small solids, as well as water resistance for up to half an hour in a meter of water. The Pixel's IP53 rating pales in comparison, providing adequate dust protection, and no submersion resistance (Hildrenbrand, 2016). In this regard, the iPhone 7 will provide consumers with the assurance that their phone is protected against dust and accidental submersion, whereas the Pixel falls short in this category.

Lastly, battery lifetime and ability to maintain charge is important to users who need to use their mobile device for extended periods of time. The unit of measurement for battery size in a cellular device is a milliamp hour (mAh) and describes “the energy charge that a battery will hold and how long a device will run before the battery needs recharging”(Rouse, 2011).

The mAh capacity on a phone is not a tell-all indication of how long a phone will last, however. Other factors such as display brightness, background tasks, and pixel density of a screen affect the battery life of the device through the day. Therefore, it is important to consider a device's ‘screen-on’ time. That is, how long a device screen will stay on with continual use.

The iPhone 7 sports 1960mAh battery (GSMArena, 2016), whereas the Pixel's battery size is 2770mAh (GSMArena, 2016). Through initial observation, the Pixel with its larger battery size should outperform the iPhone 7. However, recalling that the Pixel has a larger, higher resolution screen to power, the extra battery becomes essential to match the iPhone. Both batteries have been said to be great, but on average, the Pixel gives "around 20% more uptime than Apple's iPhone 7, especially with heavy use" (KnowYourMobile, 2016).

Technical specifications play an important part in determining which phone best suits the average user's needs. Overall, Pixel phones have better screen displays and battery/screen-on time, but the iPhone 7 provides a durability and processing power that the Pixel has difficulty matching.

Exclusive Functionalities

Both phones have qualities and features that cannot be found on other devices. This provides a general incentive to purchase these

It is important to note, when talking about exclusive functionality, that Apple's iPhones (including the iPhone 7) run on closed-source software (Diffen, 2016). That means that the operating system and software that the phone runs on is not open for community development. Any development comes straight from Apple's software engineers, which provides a foundational exclusivity through the Apple product line. This is in parallel to the Pixel, which runs an open-source software that allows easy community development (HowToGeek, 2016)

Apple has also provided a 'universal clipboard' feature with its devices. Using this feature, and devices running the latest firmware and signed into the same Apple ID can copy selections of texts or images from one device and paste them on another, and vice versa. This provides device-to-device synchronization, with the only catch being that you must own multiple Apple devices running the latest firmware.

The iPhone 7 also has its own version of a voice-based assistant, which aids in daily tasks or assists you in management of your time. Named 'Siri', the artificial intelligence has a series of voice commands that return information which helps you get things done.

Google's Pixel also features some exclusives, such as Google's variant for a voice-based assistant. Promptly named Google Assistant, the device provides and recognizes context-based commands. This means that the commands will sound more like a conversation with the assistant, as it is able to keep track of the previous command in the stack. This context-based voice command system is the first of its kind, and it is more advanced than Siri, Amazon's voice-assistant or Window's voice-assistant.". However, this is the Pixel's only notable exclusive.

For functions exclusive to a particular cellular device, the iPhone 7 provides not only its closed-source exclusive firmware (iOS), but provides other functions exclusive to it and the Apple product line. The ‘universal clipboard’ and ‘Siri’ are sufficient examples of such exclusivity. The Pixel falls short on functionality unique to its hardware, as the open-source nature of its firmware (Android) allows ambitious developers to replicate a few of its functions.

Price and Affordability

Pricing for a flagship device resides at a premium point. That is, the price tag on an iPhone or a Pixel will not be a cheap one. Considering the prices of both the iPhone 7 and the Pixel are identical for the base model, subsidies are then taken into consideration for affordability. Average consumers often seek out methods of subsidizing the cost, so that the phone becomes more affordable up front, and stays the cheaper option during a contract period.

Apple and respective carriers have historically offered new-release iPhones at subsidized prices when buying on contract. With the release of the iPhone 7, this subsidy is no longer offered, which in turn raises the overall price to be paid. This means that “consumers will have to pay for the new device one of three ways: they can pay full price up front, they can buy it through a monthly payment plan from Apple or buy it on a monthly plan from a wireless carrier.” (Rodriguez, 2016).

Google’s Pixel, however, does come with carrier subsidies. For the Pixel, “When subsidized, the...32GB [model] will cost \$199.99” (Gao, 2016). This allows the device to be more affordable upon initial purchase, in comparison to its iPhone counterpart.

Device Ergonomics

The way that a mobile device feels in the hand is important to the average consumer. If a phone were to feel awkward or unbalanced in the hand, usage of the device would feel minutely discouraging. For device ergonomics, I travelled to the Rogers store on Rideau St. Ottawa to test the three more important features when designing for comfort in hand. Referring to Appendix A, I held each phone in hand for approximately ten minutes each, timed, and tested for how slippery the device feels, how premium (expensive) it feels, and the size in hand.

Apple’s iPhone 7 was a great phone in hand. The weight was balanced evenly throughout the device and the aluminum metal body chassis felt sturdy enough to be able to survive a drop. The phone’s antenna bands also were nearly out of sight, comparing to the previous model, and screen bezels were perfectly sized and placed. The only negatives with the device were that the slippery feel of the phone was massively increased upon handling the glossy jet black model, which may leave users opting for a protective device case. This, paired with the slightly disappointing screen size for its body disqualified the device from a perfect ergonomic score.

The Pixel had a mixture of glossy and slippery parts, mixed with matte finishes below the fingerprint reader for an awkward feel in hand. Upon moving my finger upwards to reach the fingerprint reader, the traction that the phone held onto my finger with was an uncomfortable transition, and left me worried about dropping the device when trying to unlock it. Another issue with the device was its bottom chin bezel size being unnecessarily large. This just added extra noticeable space to the device. On a more positive note, the metal-lined chassis did have a premium feel to it, and paired with the glass unibody, saved the phones ergonomics from being a complete disappointment.

Phone ergonomics are important to consider as an average user, as the device will mainly be used while it is in hand. The comfort factor will decide whether a phone feels 'right' while being used, or awkward by touch. The iPhone 7 is the deciding victor through primary research for ergonomics, outclassing the Pixel's feel in hand for a similar price point.

Conclusions

Throughout this report, features of the iPhone 7 and the Google Pixel were discussed and compared through primary and secondary research to determine the better mobile device for the average user. The findings were categorized into four categories: technical specifications, exclusive functionalities, pricing and affordability, and ergonomics.

On average, the technical specifications favored the iPhone 7 in terms of both safety and raw processing power, but balanced towards the Pixel for a sharper display and battery life.

Exclusive functions to the device were in favor of the iPhone 7 for its exclusive, closed-source firmware protecting the Apple product lineup. The iPhone 7 displayed features that have yet to be discussed or implemented in Google's flagship phone, which did sport an exclusive artificial intelligence voice assistant, but was not enough to beat out their Apple counterpart.

It was worthwhile to note that the upfront pricing for both the iPhone 7 and Pixel are identical, costing \$649 USD. The major difference was in device subsidization through a carrier. The iPhone 7 does not offer this subsidy, making the Pixel slightly more affordable should you not be paying a lump sum upfront for the device.

Finally, Apple's iPhone 7 completely took over device ergonomics and feel in-hand. There were too few negatives in comparison to the Pixel's handset, which sported an awkward and aesthetically bottom-heavy design.

In conclusion, the iPhone 7 is the better choice for the average consumer. Both devices are identically expensive upfront, but the iPhone 7 outperforms the Pixel for users who want a premium-feeling flagship.

Appendices:

Appendix A: Device Ergonomics.

	Google Pixel	Apple iPhone 7
Slippery feel	-Space below fingerprint reader was not slippery. -Glossy fingerprint area was not easy to hold without fear of dropping.	-Matte finishes was not slippery. Jet black finish felt as though I could drop at any moment.
Premium finish	-Device felt premium, had metal border finish. -Antenna bands were not eyesores. -Glass unibody -Bottom bezel was too large.	Device felt premium, had more refined aluminum finish than Pixel. -Antenna bands were out of the way, compared to previous model (iPhone 6S). -Glass unibody and haptic feedback touch button were eye-catchers -Bezels are perfect size and consistent.
Size	-Slightly larger than iPhone for smaller hands -screen real-estate is a reasonable size for phone's body.	-Fits smaller hands perfectly. -Slightly smaller than the Pixel in hand. -Screen real-estate was mildly disappointing.

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