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Defining microinteractions: animation in UX

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Title	Defining microinteractions: animation in UX
Number of Pages	42 pages
Date	5 May 2017

Degree	Bachelor of Engineering

Degree Programme	Media Engineering

Specialisation option	Media

Instructor(s)	Merja Bauters, Researching Lecturer
	Anne Perälampi, Language Teacher

This paper discusses the topic of animation in User Experience design and what motion designers can learn from Disney's principles for animation. Moreover I will try to recognize when and how motion touches the emotional side of people's perception and how it can help guiding seamlessly through a digital service. I will also evaluate Disney principles from the perspective of user experience journey.

On a practical side I worked at Telia company helping them in rebranding with designing a new motion language for the application. During this work I tested and saw which principles should be used and what should be avoided when designing digital motion.

Keywords	Transitions, animation, user experience, user interface

Helsinki
Metropolia

1   Introduction

"Don't make something unless it is both necessary and useful; but if it is both necessary and useful, don't hesitate to make it beautiful" — brand philosophy of Design House Stockholm.

I'm coming from the intersection of two worlds: logical and artistic. I love the clarity of mathematics and some aspects of information technology and at the same time I like things to transmit that indescribable natural feeling of beauty and ease. Studying in the Media Engineering Program I have experienced a principal rule: it doesn't matter how it looks like, as far as it works. "*We are engineers, we don't care about looks*" – is how my fellow classmates explained their actions. Nevertheless, even in programming, neat and well-structured code is fundamental. In my opinion, it is not only enough to have a working product, but it is also essential for it to be elegant and enjoyable.

Long gone are the days of seeing static information on your screen. Modern technology allows us not only to get the information we need from web platforms but also to enjoy it. With increasing bandwidth and Internet speeds, with the evolution of HTML, jQuery and Javascript, products are allowed to become fun and enjoyable, while being useful and practical. Remember the Flash era when animation was something like 'wow, it bounces!'; nowadays it is more like 'it doesn't do anything except bounce? Ugh!'.

Animation means moving images, one of the purposes of which is to entertain. It has its roots from 19th century and an extensive history from the first hand drawn simulation to the contemporary 3D animation. We can even look deeper and note that, throughout human evolution, detecting movement has been critical for survival (Pratt et.al 2010, 1728), and ever since we have been paying our attention to anything that moves.

As George R.S.Weir and Steven Heeps state: "with careful selection of technique and form of expression, animation could be more effective in message delivery than traditional methods as text and still images". Sound is also a powerful medium for humans to react. It is even faster for human perception that moving imagery: 140–160 milliseconds for sound versus 180–200 milliseconds for visual. (Welford 1980, 124) nevertheless Dan Saffer (2013, eBook) advices to use sound for highest priority microinteractions. With phones taking popularity over desktop computers and wearables appearing and gaining increasing acceptance, the screens shrink and limit in size, thus making it more challenging to provide information to the users. Each of these devices requires a different set of interactions that impact how, and if, users use a digital service. Switching from keyboard and mouse to touch gestures, we get more possibilities to engage user with the product.

At present I see the tendency towards speed/technology rather than usability/design aspects of interactions design, or even its complete absence. In this

case a good product/service may never utilise its full potential at serving the masses, getting lost among others that are simply easier to use. Therefore in this paper I will prove why carefully designing every aspect in essential for a product/service to be successful. And as a motion graphics enthusiast, I will be talking about the role of animation in web platforms.

As a practical part I chose to make motion language for the application for one of the major telecommunication companies in Finland, Sonera. There I will test the practices described below as well as traditional animation principles from Disney and analyse their significance or the opposite.

2   Microinteractions. The role of animation in UX

Any digital product is unique, every one of them has its own individuality even though they might carry the same function, like different mail agents on your phone. This individuality is outlined by microinteractions. Microinteraction is a single task-based engagement with a device. Dan Saffer defines microinteractions as "single moments within a use case". (2013, eBook) They appear in both physical and digital worlds. It can be a toggle on/off switch on a lamp or a play the next chapter button or putting the volume down on a speaker or press home to unlock. An app consists out of hundreds of microinteractions. Microinteractions are shallow and fast that they are not noticeable. They make UX much more rewarding, offering a subtle guidance to the users. Poor microinteractions cause pain and frustration; good ones tailor the products and become signature moments of the brand. Well known microinteractions such as 'pull to refresh', autocorrect, autofill or Facebook like button immersed into our life and became part of it. Microinteractions compose a crucial part of user experience (UX). Effective UX provides satisfaction from using the product and tells that the service is understandable and easy to use, that it doesn't create hesitations towards its interface and workflow. As Steve Jobs said: "*some people think design means how it looks. But of course, if you dig deeper, it's really how it works.*"

Animation wasn't present in the early days of UX design, but within time its role has been getting more prominent (see fig. 1). These days animation in UX has become just as essential as static design (Markus, 2015). Good animations make the interface smoother, more natural. "*Sudden changes don't exist in the real world!*" – says the Disney legend Glen Keane. Before every seemingly sudden change the whole ecosystem is preparing for it's launch. The same can be reflected in digital world. Any product whether it is a website, and app or a native operational system needs to be intuitive and human. Animation brings UIs to life helping users understand where things come from, where they can locate them again if necessary.

There are many ways how to develop and improve microinteractions, and interface animation is one of them. Animation makes UI more anticipated and easier to navigate, it opens up the bigger picture offering a sense of direction and understanding for how to get around, makes feedback user-friendly and shortens the time needed for processing the information. (Apple Inc. 2016) Some-

times it takes more time to provide the animation versus just displaying the information. In those cases the time perceived by users to comprehend the message is longer. Yet, users are used to the common actions, as with the shake-animation used for showing incorrectly put password is understandable for users.

Figure 1. UX diagram. As shown in the picture, motion design currently takes a small part of whole UX Design, but nevertheless it is as important as other aspects of it. Copied from envis precisely GmbH.

Rachel Hinman (2012) states: [motion] is a design material you can use to help guide users through the mobile experiences you create. We become much more immersed in the experience, when animations visually mimic the real life reactivity to our gestures (Bank, 2014). Animation helps users operate through a product/service, guides them along its structure and makes interaction easier. As the storm cloud approaching from the horizon, it helps the brain understand information hierarchy from further away, from the greater perspective. Motion draws our eyes to crucial parts; it captures user's attention alike to waving our hand when we want to get noticed. The addition of movement to a mobile experience can provide clarity, supplementary information about context and, frankly, a dash of joy and fun. Good animation in UX is invisible, yet functional. Animated transitions are so subtly integrated into interface, that they are unnoticeable and taken for granted. For example, on iOS devices 'slide to unlock' field

on a start screen is visually mimicking the sliding action, giving you a subconscious hint (fig. 9). Or in Facebook Messenger app, as it is shown in Figure 2, when someone is typing a message in your chat, the animated icon with three dots appears giving you a reflection of the action on the other side, instead of plain waiting. (fig. 2)

Figure 1. An example from the Facebook app. Whenever someone starts typing a comment or a reply, three dancing dots appear, representing the action being in the process.

Described below are the functions of animation used in UX.

1. Action follow-up.
2. Visual Feedback.
3. Giving a hint.
4. Highlighting important elements.
5. Reducing cognitive overload.
6. Delight.

In the upcoming sections of this paper I'll explain each of them to explore more details and possible implications.

2.1 Spatial relationship. Action follow-up

Whether it is a website or an app, a new user needs to figure out what is happening on the screen. As a stakeholder of this digital service, it comes to your advantage to make this easy. The first-time user cannot really predict an interaction that is about to happen; nonetheless right animation helps the user stay oriented and not feel that content has suddenly changed. A good transition

helps guide the user to the next step of an interaction. When an action is made, the interface can show the transition from state A to state B (see fig. 3 example with Shorts navigation app) creating a visual connection between transitioning states. Animation can confirm your actions and follow you towards the outcome; it shows relationships between information and makes a mental model of related content revealing where the hidden object goes and how to discover it again. It also helps to avoid confusion when layouts and elements rearrange or change and improves the overall beauty of UX. John Blackburn (2017) notes that if animation is done right, it can replace clutter of an interface with elegant simplicity. Expandable drawers, information groups, and hamburger menus help a product/service look clean and organized, while applied animation helps users to reach the information they need in milliseconds.
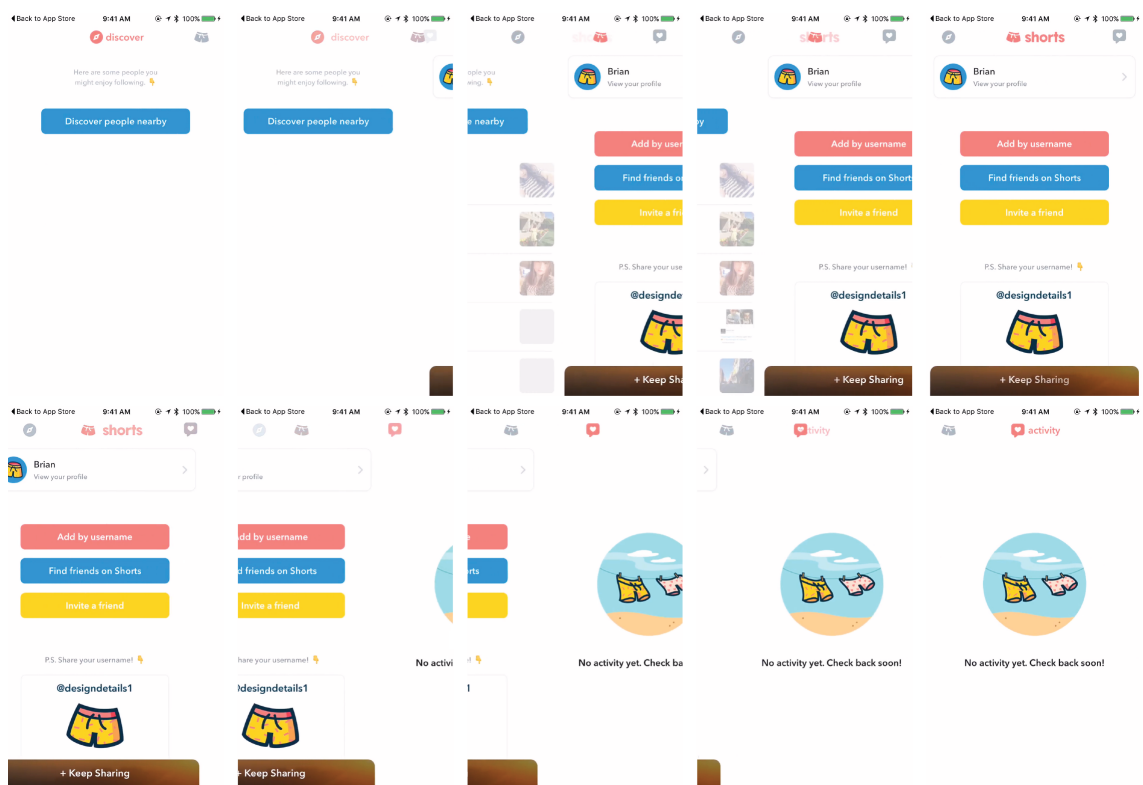
Figure 2. An example from Shorts app. A navigating between views happens seamlessly, the icons follow a swipe action, fading accordingly. It creates a mental model of how dashboard is constructed. Data gathered from Lovin (2016).
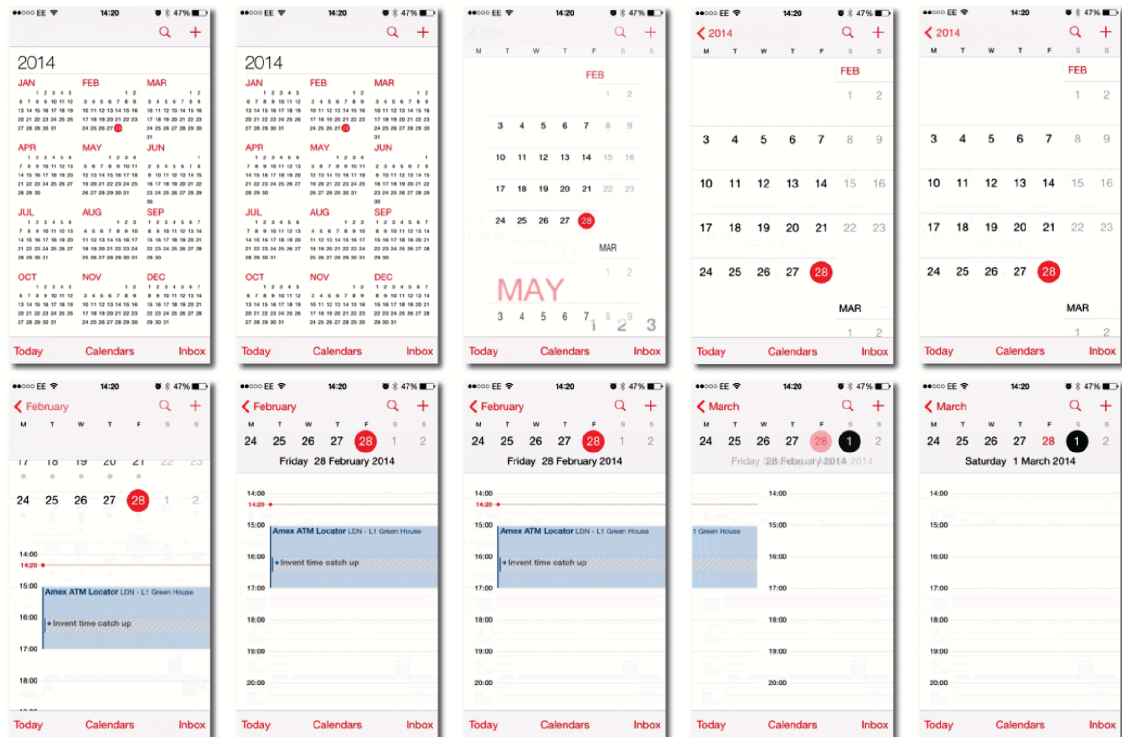
Figure 3. iOS Calendar. The example from Apple's calendar. Switching from a year's display to month's is done in an easy zoom; the same technique is used in month – week transition. It gives the user the understanding of continuity of the year-month-week-day concept. Data gathered from BeyondKinetic (2014).

Looking at Apple's Calendar app for iOS 7 and higher we can see a good example of a follow-up provided by animation. When switching views from year to month, animation guides you between two visual states in the way that a user gets a feeling of diving deeper into information.

2.2   Visual Feedback

Animation helps us understand if we are doing something right or wrong. According to Nielsen's 10 Usability Heuristics for the User Interface Design "*The system should always keep users informed about what is going on, through appropriate feedback within reasonable time*" (Nielsen 1993, 134). A system should never leave a user to guess what is happening or going to happen. Feedback makes a user more comfortable with their actions. A big part of UX is keeping a user informed about what is happening and reassuring him or her that the app is working properly. Functional animation provides information in fast and easy way. Its function is to show that the system has received a user's input and approved or rejected it (fig.5). It is essential for the user's natural desire for acknowledgement. Take an OS X Yosemite for example, when incorrectly entering password or login one sees a shaky field indicating a wrong action (fig. 6).
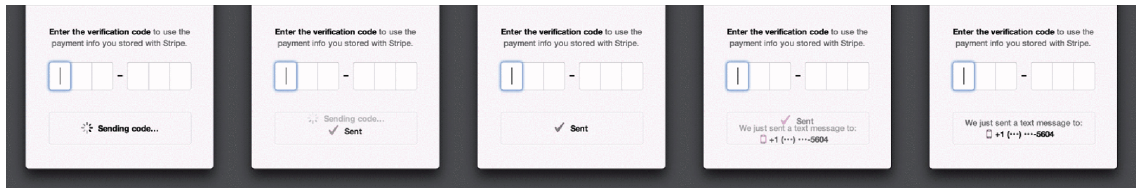
Figure 4. Verification code check system. Even though the system doesn't know whether the code has been sent to the user's mobile phone, it gives a feeling of insurance that user is doing well. Data gathered from Villar (2014)
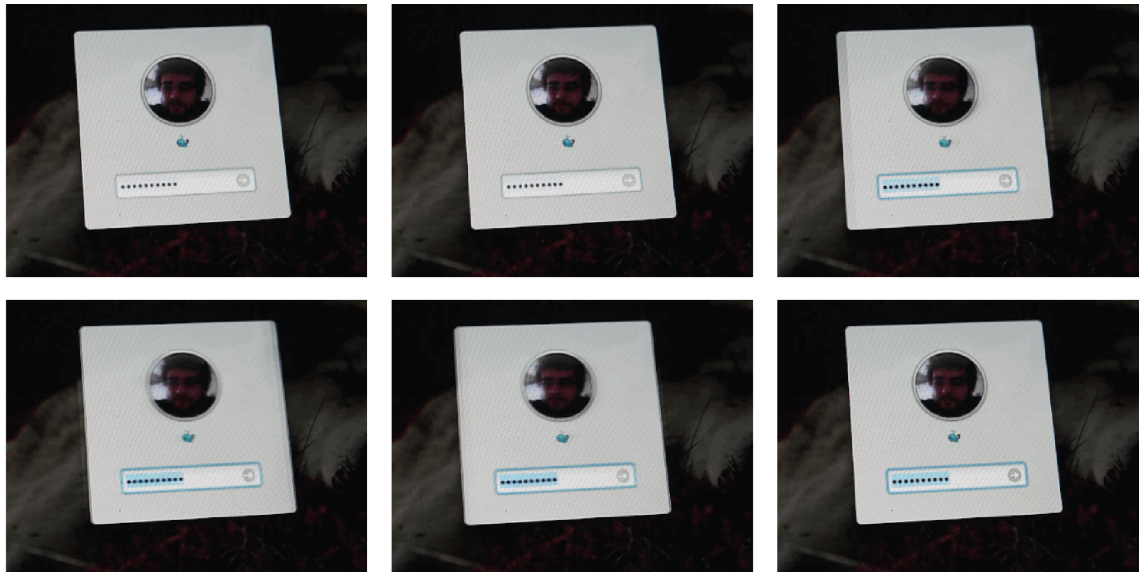

Figure 5. Although it is barely visible, the login window shakes left and right when the password is put incorrectly. It resembles the 'no' shaking action, which is widely understood around the world. Data gathered from @*gardaud* (2013)

Yet another example is submitting a form. When 'submit' button is clicked, a small field 'submitted successfully' appears. A very common feedback function is used in progress bars. Sometimes a user doesn't understand what is happening or if anything is happening at all. Showing a small animation prevents from doing unnecessary actions. Feedback function is very important with e-commerce. When using online web stores, users are careful and nervous of loosing their money because of technical mistake. In the worst example from clicking 'pay' button several times, while system is busy with processing card details. Figure 7 illustrates a poorly executed 'Save changes' interaction: after user clicks on the button it greys out and nothing is happening after leaving the user doubting where the action has been done.
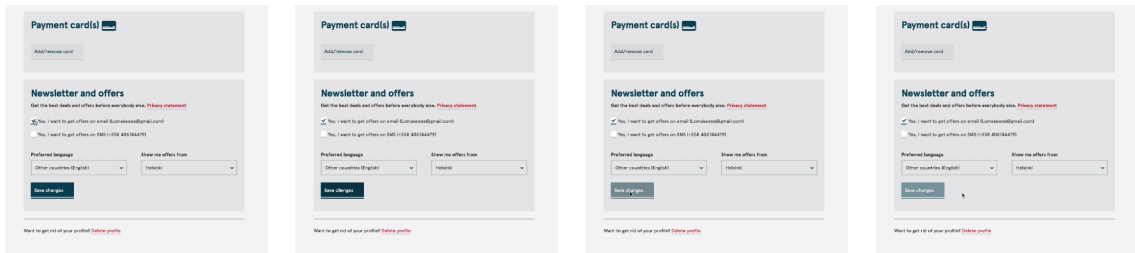
Figure 7. An example showing no feedback of clicking a button. Although a hovering action is present, when clicking the button nothing happens leaving a user doubting whether the action was executed or not.

In a good UI an input feedback should be instant. After filling a huge form and clicking the 'send' button, an 'error' message appearing only after the 'send' button is triggered makes a user instantly frustrated. Besides the irritation of finding the fault input field, there is a big chance that some of the fields get empty, making you putting the information again. Providing information, automatically appearing when needed, will ease the frustrating process of filling rules (fig.8). For most of the people, this information would be unnecessary, they don't want to see a bunch of text before each empty field. Thus, that info can be hidden in a small icon, which expands to a small box in case you hover or tap on it.
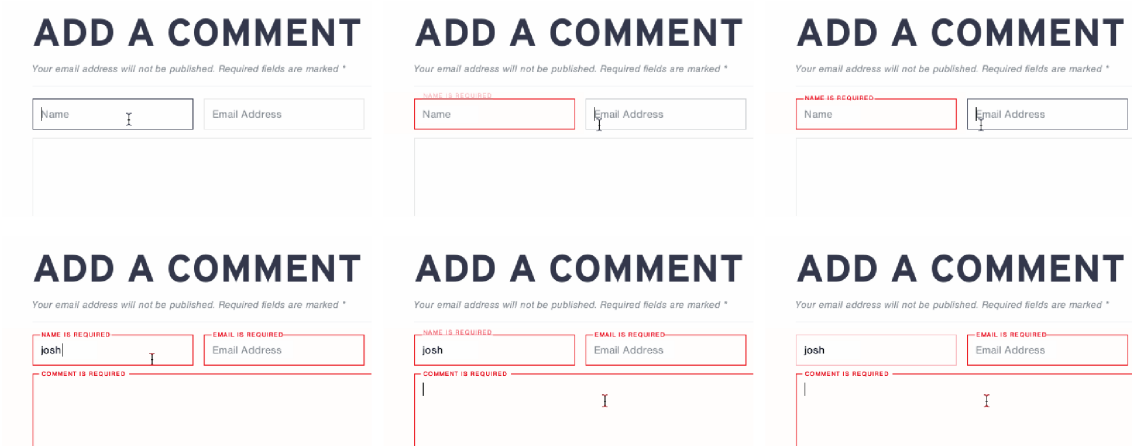

Figure 8. A form example: when user fills in form, the system instantly checks for the input text and kindly reminds the user to fill the fields if there is a mistake. The process of feedback is given straight after the users leaves that field. The words '# is required' appear only when there is a mistake, sliding from the top and colouring the filed red to attract the user's eye. Data gathered from UYI (2014).

2.3   Giving a hint

This is another good way to provide help to a user. With all the development of new techniques, such as gesture-driven interfaces, like force-touch from Apple, it is essential that the user understands and uses new know-hows. If a button is clickable the hover effect should show so. If an element is movable, the animation should give the user such impression. Material design says: material in motion guides focus to the right spot at the right time. Movement communicates to the user, making is understandable which action user can make and which not. (2016.) (fig. 9)
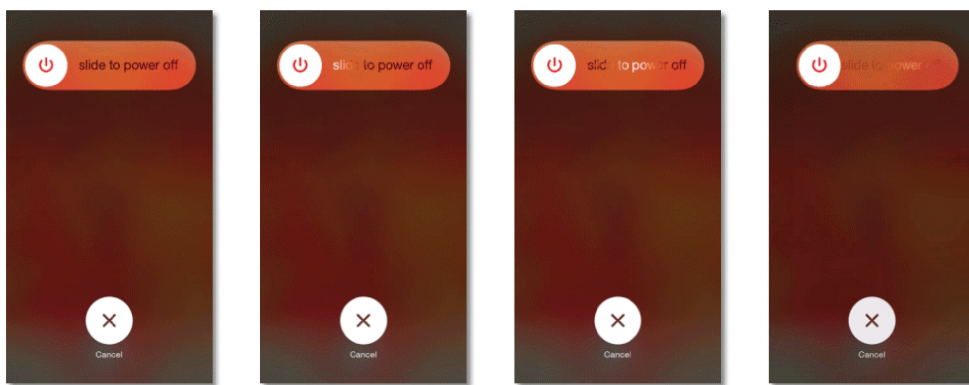
Figure 9. Unblock screen. A small highlighting animation is used on the words 'slide to power off' on iPhones, mimicking the action the user needs to preform to turn the phone off. Data gathered from BeyondKinetic (2013)
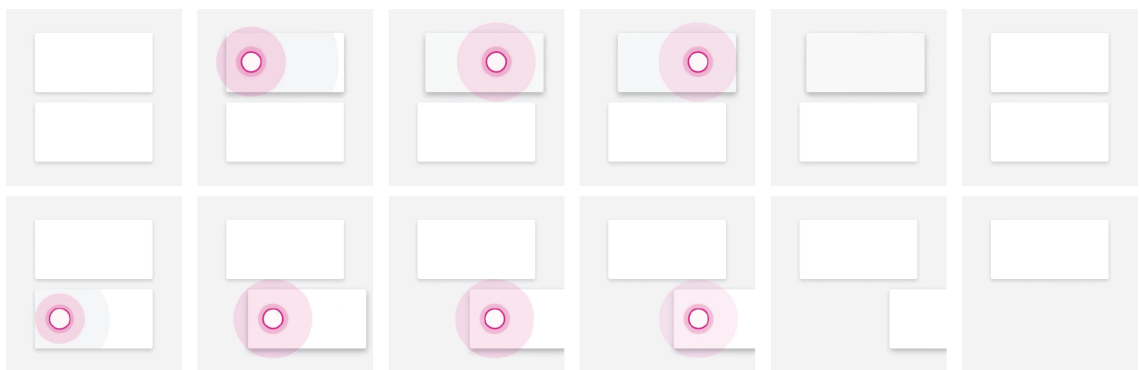

Figure 10.   Example from Material Design: the first raw shows material showing that action cannot be completed by not allowing the element to be taken out of the screen. The second raw shows the opposite, allowing user to continue swiping right to remove the element. Data gathered from Material.io.
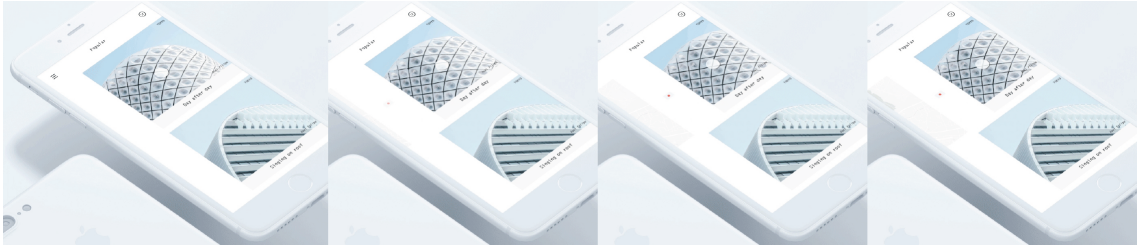
Figure 11.   An example of a concept app: swiping gives you a sneak preview of what happens next. In this case a map is showing from the left following the swipe gesture. Data gathered from (Neko, 2016).

2.4   Highlighting important elements

The composition of the real estate of the screen is crucial and more crucial is salience. (Kress and Leeuwen 1996, 212) Each screen of the digital product is intended in a way so the user performs some kind of action there. When there is a need to specify a certain interaction element or action, animation can highlight it more efficiently than any other tool. It helps draw users' eyes to an important notice that can't be ignored. Unfortunately advertising banners are done in this way using heavy animation to attract users from the main content of a page. Here the animation is practiced to distract users from the initial purpose and transfer them to the proposed page. In time people stopped checking the areas on the page, where banners are usually placed and the term "Banner blindness" was born. One suggestion for the animation not to make is 'banner' like is to make a consistent and steady motion; banners usually contain flashy edgy or rapid animation to attract user's eye.

In the following example, it shows that the submission was completed by highlighting the button and stating that the process was successfully completed.

Figure 12.   Submit button. Data gathered from Garven (2014).

2.5   Reducing cognitive overload

There is no need in displaying all the information available. An interface might scare users away by giving them too much material to process at a single time. Erik K (2016) uses the term *'progressive reveal'* which is based on the principle that user's interest drives information fidelity. A study conducted by Paul Ayres and Fred Paas (2007, 697) shows that found that well-designed animation could reduce cognitive load for problem-solving tasks. Human's brain divides information into more manageable pieces to commit it into working memory. People tend to chunk information whether it's text, sounds, pictures or video. Using animation, a developer can hide some of the content, presenting one handful of information at once, thus showing what is really important for the user at that particular time. It gives a cleaner and less cluttered UI, giving the user control over what she wants to see at a time.

Figure 13 shows how the whole form can fit info one field. It goes step by step, starting from a name to email to password taking one snippet of information at a time and focusing on a single step of interaction.
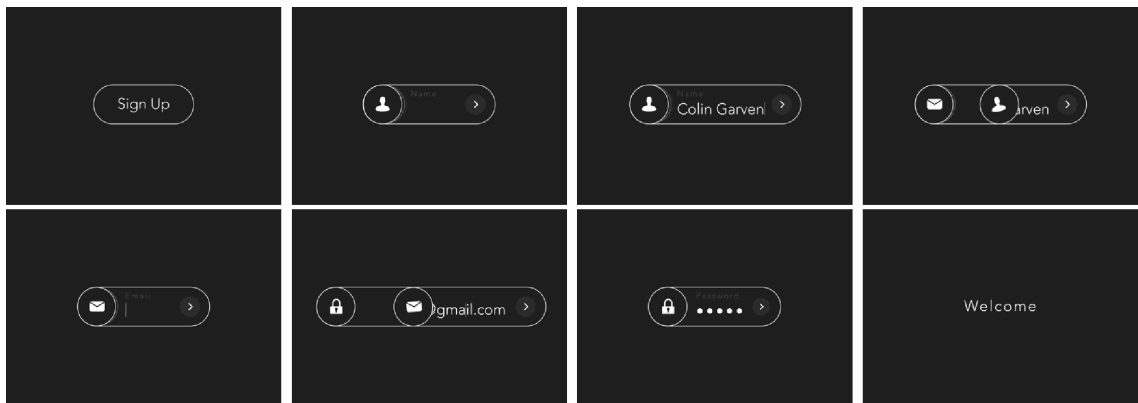

Figure 13.   A progressive reveal example. Fields are shown one at a time, minimizing user's confusion and focusing on what is important at the moment. Data gathered from George (2015).

A more natural predictive search is becoming more common. Devices become smarter, they can predict user's input, next step or choice of preference, decreasing cognitive effort from user's side. Dan Saffer has a rule: bring the data forward. In 2015 Apple introduced a forced touch for watches and 3D touch for phones (Apple Inc., 2017), which reduces a number of user actions in times. Now when someone wants to set an alarm, instead of tapping the icon and then tapping the alarm section, one can 3D touch (tap and press harder) creating a shortcut straight to alarms skipping one additional action. Animation is a tool to bring the window with quick access to the screen, making it easy understandable for the user.
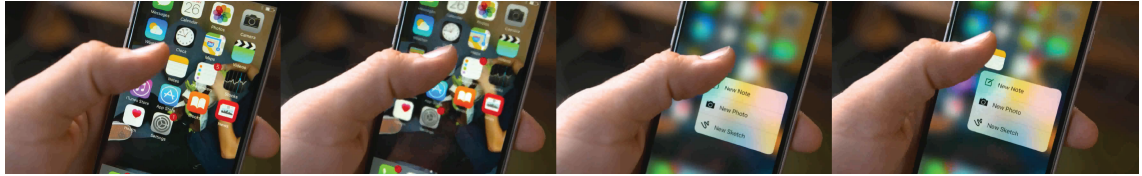
Figure 14.   An example of force touch in action. When introduced force sensors Apple creat-
              ed a third dimension (depth) on a device screen. Now if a user presses harder it acti-
              vated a 'quick peek' function, bringing users needs closer to the execution. Data gath-
              ered from Diaz (2105).

2.6   Delight

Last but not least, animation can be used to add character to user interfaces
and make them more fun to use. Dan Saffer uses term 'signature moments' in
his book. Those signature moments are microinteractions that differentiate the
product from others. Translating to other words those microinteractions drive
delight. Delight relies on an emotional side of using the product instead of logi-
cal described above. It establishes emotional engagement with the user. Delight
can be divided onto functional and entertaining. Functional delight shows up in
small interactions, like menu icon turning into back icon when triggered or
play/pause icon (fig. 15). Usually it applies to the states that cannot be on at the
same time (on/off, play/pause backward/forward) and transforming them signi-
fies that the two actions are linked. Taking Eames's phrase again "*Details make
design*", users are delighted by clear and functional design. Clean and smooth
state changing animation can create a more alive feel and make using the ser-
vice more pleasant and entertaining. Scroll-triggered animation as shown in
Figure 16 is common nowadays when mixing a boring static interface with a
funny animated manner.

Figure 15.   Material's design example of a menu icon triggered and turning into a back icon
              and also play/pause action. Data gathered from material.io.

Figure 16.   Sometimes "pull to refresh" loader is so joyful and funny to watch, that some users keep playing with it, thus engaging with the product. Data gathered from Prudnikov (2014).

Entertaining delight is not necessary in AI, but very much welcome. Loading content takes a lot of time? To keep user hooked and interested nice animation can come in handy. Here where one needs to wait, it might be funny to put interesting loading bar instead of overused loading icons. Figure 17 shows that in actions, simple yet attractive animation of a sunrise. Adding sun's eyes movement make it more enjoyable. Instead if percentages the sun represents the amount of loaded content. Although there is one thing to remember: as Nielsen (1993, 241) suggests that in case of loading pages a progress bar should be presented only when the waiting time is more than 10 seconds.
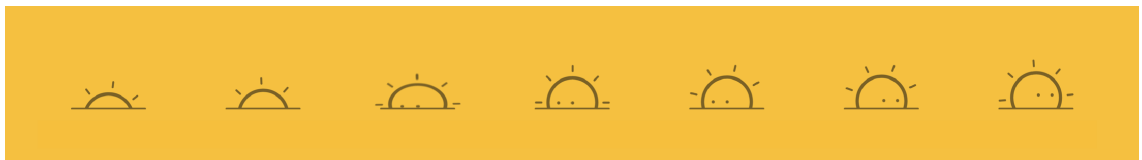

Figure 17.   Nice loading animation. Data gathered from Pearson (2013).

Nielsen's First Law of Computer Documentation says*:* people don't read it. Likewise people skip tutorial part of the product introduction. During their survey Penrose and Seiford (1998, 366) found that less than thirty percent of the people looked at the manuals before using the software. This tendency shifted from manuals to web content. Lefevre and Dixon state that people routinely ignore written procedures and only follow examples (1986, 25) How to catch their attention? Keep tutorial not being boring, make them alive. Providing animation complementary to plain text will ease user's cognitive load. Figure 18 shows the example of introduction to the app through simple steps using text and animated instructions. This example perfectly illustrates subchapter 2.6 Giving a hint. Here both principles are joined together in order to tell users how they can interact with elements on the screen.

Figure 18.   Adding simple animation to a text instruction speeds up the amount of effort needing to understand the information. . Data gathered from Sánchez-Blanco (2014).

Delight can appear in such small details like panning icons while tilting a phone. Using hardware features like iPhone accelerometer, one can create animations. It is pure entertainment, but paying details to such small details talks about craftsmanship of the product itself and engages users deeply into an app.

One has to be careful designing delightful animations. Timing takes a big part of executing nice and sleek movement, which might be precious for the user. More about this is discussed in 'First time usage' chapter.

3   Disney principles and techniques used in UX animation

In contrast to the traditional cartoon animation, UX animation plays a subtler role but is as much important. Let's get back to the roots and look at likely the most influential and important company for motion design — Disney.

Disney is well known for creating a strong foundation and school for animation that established a list of animation principles still widely used today. There are 12 basic principles created by the first two animators Frank Thomas and Ollie Johnston (1981), designed and explained to understand how we move and project it onto paper. Frank and Ollie spent a lot of time observing environment and applying the gained knowledge to animation. Those principles are deeply entangled with each other creating the illusion of reality on a 2D screen.

These principles are:
1. Squash and Stretch – action of an illusion of weight and volume of an object as it moves.
2. Anticipation - preparation for a major action an object is about to perform.
3. Staging – presentation to an idea so that it is unquestionably clear.
4. Straight Ahead Action and Pose-to-Pose Action - two different methods to creation of movement.
5. Follow Through and Overlapping Action – when the main object stops, its parts don't stop at once, they continue moving.

6. Slow In and Out - the space in-between frames to achieve subtlety of timing and movement.
7. Arcs – all movements are happening in arcs or circular motions to give the object more natural action.
8. Secondary Action – additional actions of an object in order to add more dimension.
9. Timing – proper timing maintains appearance of an object according to the laws of physics.
10. Exaggeration – using an extreme action for emphasising a main action.
11. Solid drawing – taking in account volume and weight of an object in three-dimensional space.
12. Appeal – charisma of an action to please the viewer's eye.

Although originally developed for animated films and television, these principles are applicable to screen-based digital experiences, too. Digital giants like Apple and Google released set of their human interface guidelines (HIG) for creating products. Their aim is to improve the experience for the users by making application interfaces more intuitive, learnable, and consistent (Wikipedia, 2016). iOS HIG date back to 2008 soon after the release of iPhone 3G AppStore on iTunes (Apple Inc., 2008), which was sold in one millions copied in the first weekend (Apple Inc., 2008) making iOS HIG a standard for future years. With each release of iOS Apple releases a new set of interface guidelines keeping them up to date. Material design by Google was published in 2014 and is used as a set of uniform principles about how UIs should behave in the digital environment. Google created a system using its own lexicon and rules to operate uniformly across all platforms and device sizes, rather distinctive from iOS interface guidelines and continuously develops it further. Although other companies such as Windows and IBM have their own Design Guidelines, I will use iOS and Android HIG as they are major players on the market (Market Share Statistics for Internet Technologies, 2017). Further in this chapter Disney principles will be examined from a traditional point of view and their relation to digital interfaces of iOS and Android.

3.1 Slow in and out (easing)

Let us think of the physics of the real world, where objects need time to accelerate and slow down. When creating an animation, the trick would be to add more frames of the object near the beginning and the end of its movement, and fewer in the middle. This effect makes the UI appear as if it was controlled by the laws of inertia.
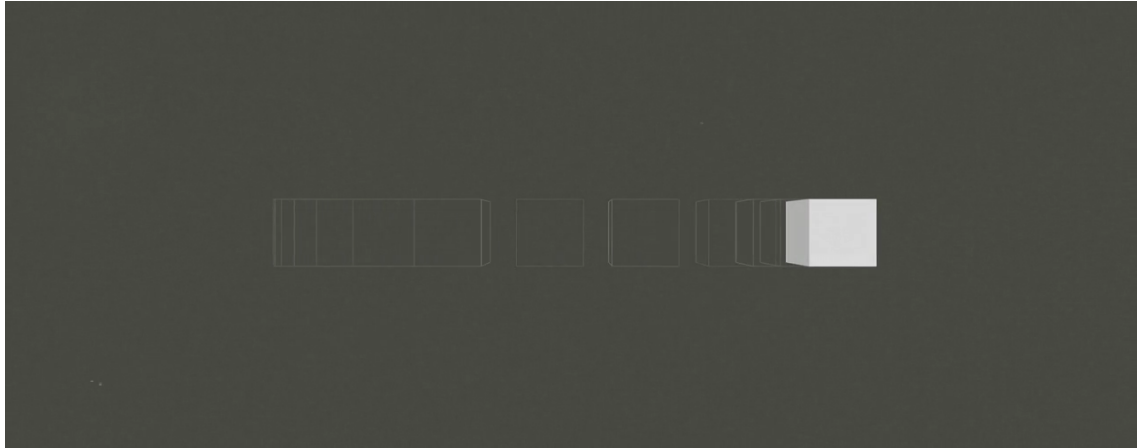
Figure 19.   In traditional animation easing means the amount of frames drawn in a second.
              They are represented by dashes on the timeline: upper animation is a linear movement;
              bottom animation is an ease-in-out movement. Data gathered from Lodigiani.

Apple's invention (Ording 2008) inertial scrolling fits perfectly here. When scroll-ing up or down, if one flicks his fingers, it will keep scrolling instead of stopping. This invention following a basic rule of physics and slows down slowly without a sudden break makes user experience more comfortable.
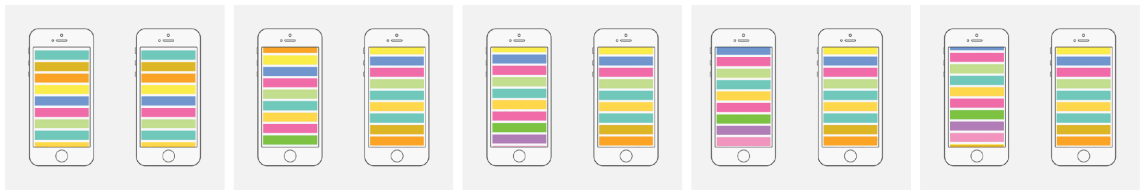
Figure 20.   portrays 2 examples of easing when scrolling lists on mobile: linear vs. inertial.
              Note how the speed changes from the beginning to the end of motion. The UI mimics
              the laws of physics having a higher scrolling speed in the beginning and lower in the
              end.

Motion with swift acceleration and gentle deceleration feels natural and delight-ful while linear motion feels mechanical (Chang, Ungar 1993). Furthermore Ma-terial design states that motion appears more natural and delightful when ac-celeration and deceleration occur asymmetrically (Material 2017).

Nowadays easing is widely known in developer community and used in creating digital services by default. In html5 phase it is not enough to put a basic ease-in/ease-out curve, but creating custom bezier curves making product stand out with its personality. Customisation in easing represents delight function men-tioned above.
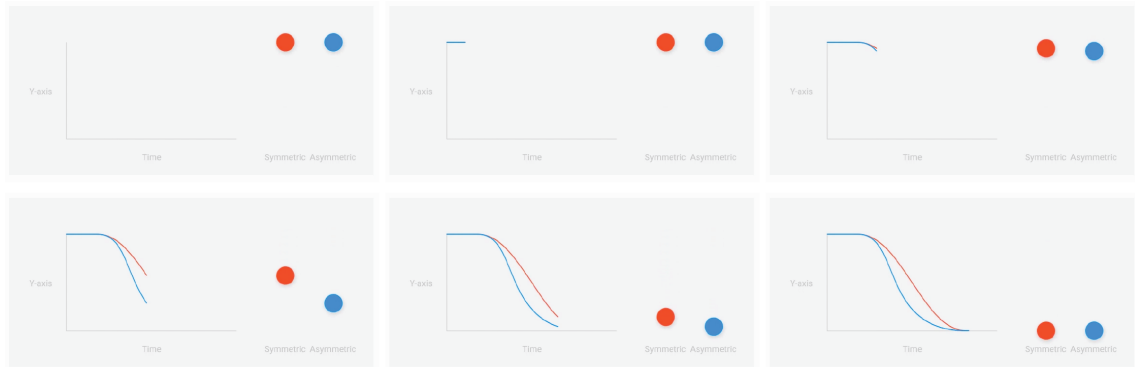
Figure 21.   An example of asymmetrical easing from Material Design. On the left there is a graph showing the relationship between time and distance, on the right moving balls with corresponding colour. The screenshots are made with 150 milliseconds time interval with a purpose to show that the balls move unevenly. Starting and finishing at the same time two balls yet have different moving rate differing from each other. Data gathered from material.io.

3.2   Squash and stretch

People and objects have mass and the quality of their movement often shows how rigid they are. Objects the likes of bookshelf or wooden chair are rigid and have low flexibility. On the other hand, soft surfaces as clothing and plant leaves have higher flexibility and are less rigid. To accurately express the rigidity of an object one can apply squash and stretch principle.
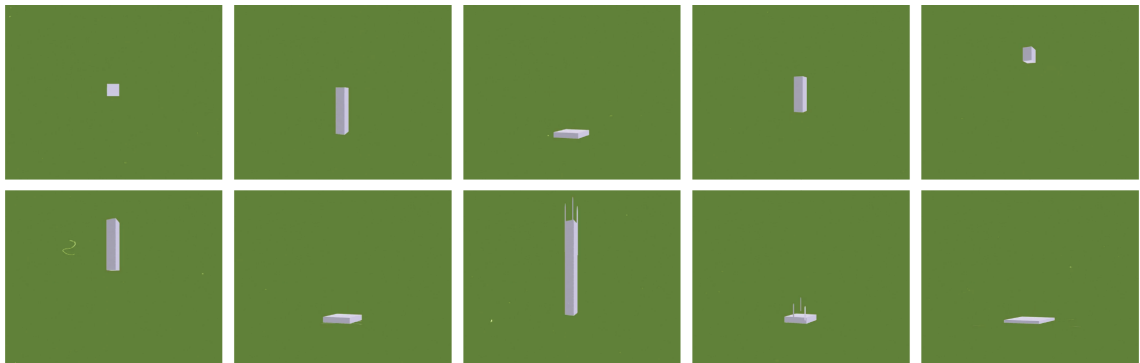

Figure 22.   An example from Disney principle. A scene of a jumping box being squashed and stretched at some points looks like a cuboid, presents an object with a sense of flexibility and plasticity. Data gathered from Lodigiani.

Although this principle is not widely used in UI animations, sometimes user interfaces can benefit from squash and stretch too, as in the example below with a genie effect when minimising/maximising a window in Mac OSX dock. You can see the relation between the icon on the Dock panel and a window, when it is stretched while minimizing into an icon.
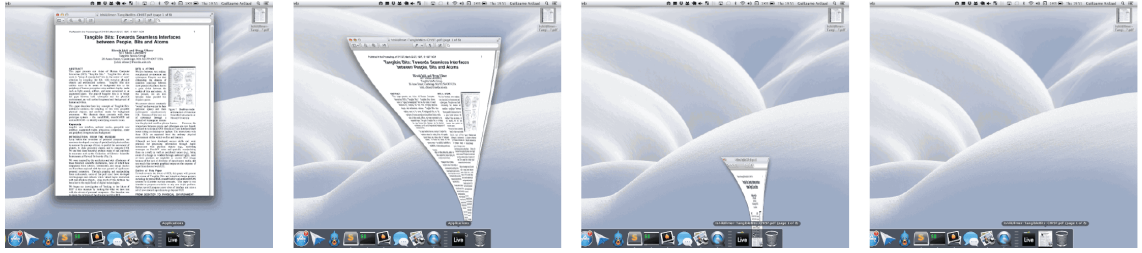
Figure 23.　　Icons menu. Data gathered from @gardaud (2013).

Materials Design response to squash and stretch option is asymmetric transformation of an object. The exception is where a transformation is occurred between a circle and a rectangular. In this case the circle cannot be asynchronously expanded.
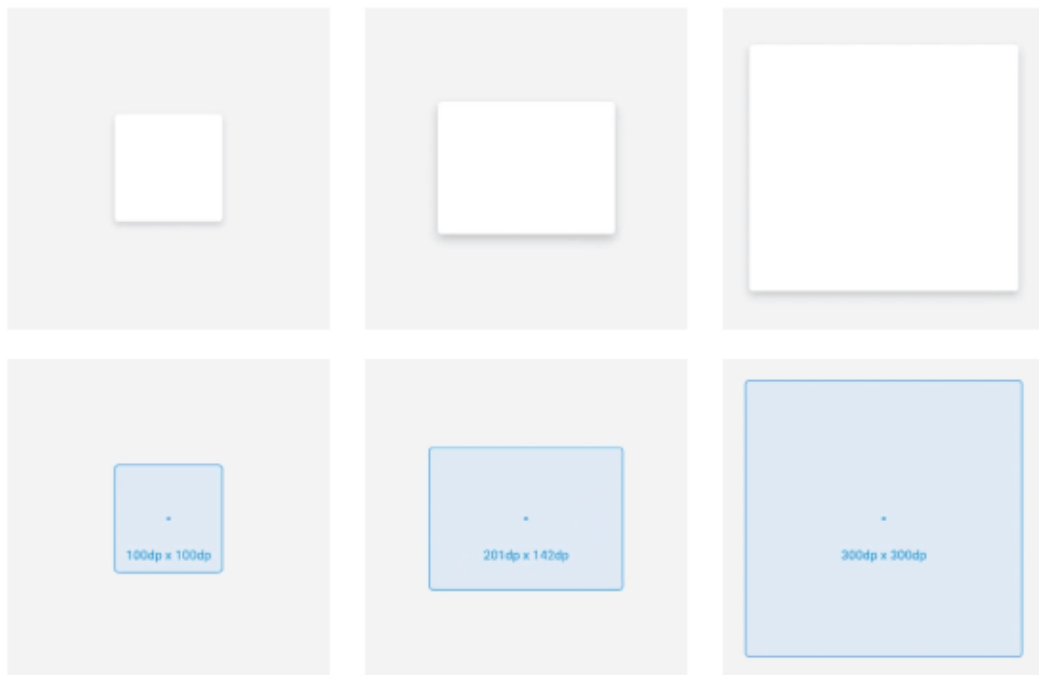

Figure 24.　　An example of expanding object from Material Design. As the time progresses it is visible that the object scales asymmetrically along x and y-axes. Data gathered from material.io.

3.3   Arcs

All organic objects, including us, move in circular motions. If a man is lost in the forest and starts moving forward, he will end up where he left off. On the other hand, mechanical things, such as cars, trains or robots move along straight lines. In the traditional animation arcs are a natural way to move for humans, when straight lines are more related to machine-driven objects (Johnston, Thomas 1981, 62). It is a task for the designer to choose what kind of feeling his product has.
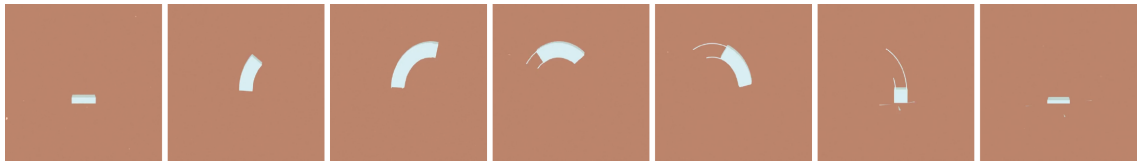

Figure 25.   Jumping of a box is done in a circular motion, following the rules of gravity. Data gathered from Lodigiani.

Even though there are no specifics in Apple Guidelines, arcs are still present in standard programs, like is shown in Figure 26.
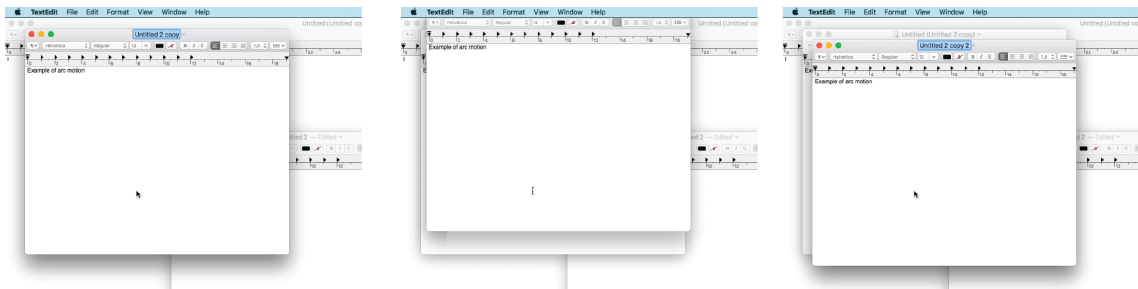

Figure 26.   An example of arcs in motion when duplicating a document. When triggered a new file appears from the old one and positioned on a screen in a circular motion in front of a former.

Material Design states: Rising against gravity in the real world requires effort. Material Design acknowledges a physical force of gravity and translates it to the digital world. Object affected by gravitation and acceleration move in circular motion (see Figure 27). It is even gone deeper specifying which curves should be used in different cases to depict the transition as close to reality as possible. Material Design makes an exception only in case of movement in single axis. There, movement should be simple and not appear unnatural.
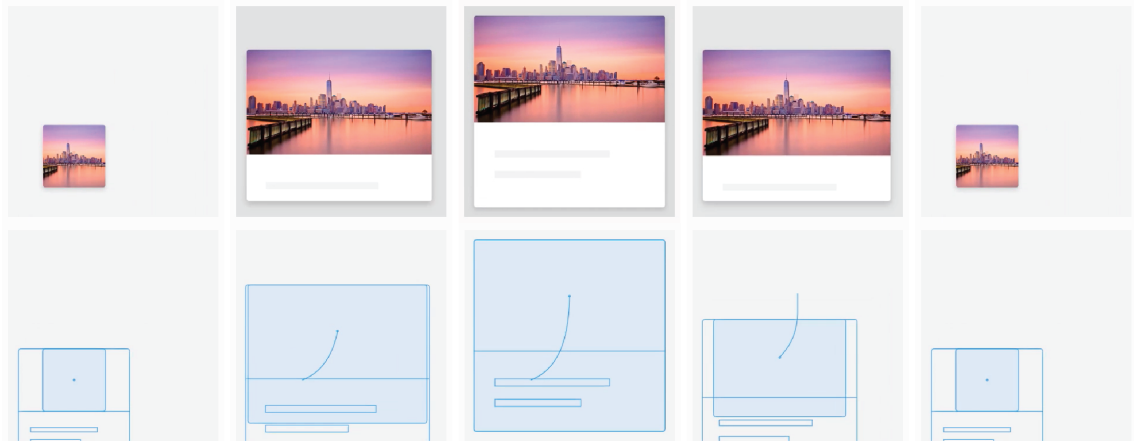
Figure 27.	A visual representation how objects should move in circular paths by Material Design. Instead of moving on a straight line, the icon movies along an arc, creating the illusion of a real object. Data gathered from material.io.

3.4 Anticipation

Anticipation is a perfect example of one of animation purposes described above: giving a hint. Users need to always know what is happening on the screen, thus the system should be as transparent as possible to gain user's trust and likability. To give users a clue about what is about to happen one can create a hint or in other words a visual effect of anticipation.
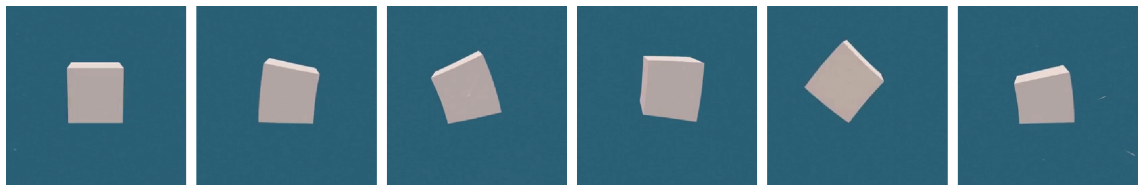

Figure 28.	an example from Disney principle of anticipation. Before rolling to the other side, the object prepares itself by 'swinging' backwards and forward gaining the speed and enough strength to roll to the other side. Data gathered from Lodigiani.

Coordinating the components of a scene such as lighting, composition and the form of an object or character can tell about what is coming up. Bay-Wei Chang and David Ungar give a perfect example from the traditional cartoon animation: the Coyote in the Road Runner cartoons springs back onto its rear leg before dashing off after Road Runner. This move prepares the user for the next action, a chase. (Chang, Ungar, 1993, 40]. If an element is pushable or movable it should seem to be so. It should act tangible. This rule is used in Tumblr app (fig. 29). When rearranging images, a user selects an image and moves it to the desired destination. Before releasing his finger, when image is hovering upon other images, they move slightly to the sides, thus providing a hint, that it is possible to drop the image to chosen place.
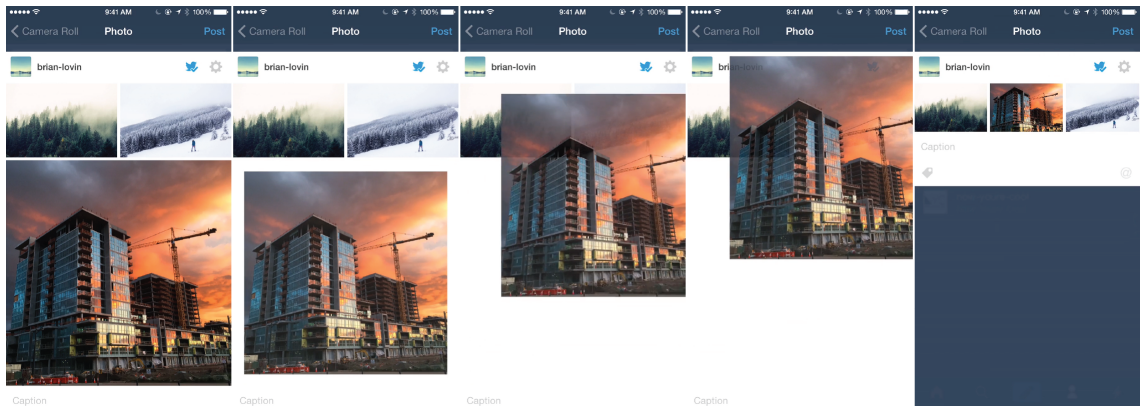
Figure 29.   Tumblr composer. Reordering images is simple with system hints and subtle element movements. Data gathered from Lovin (2016).

In Material Design anticipation is expressed by radial action (fig. 30). Radial action is used to clarify the connection between user input (trigger) and surface reaction (feedback). The ripples are created to give user an affirmation that the button has been clicked.
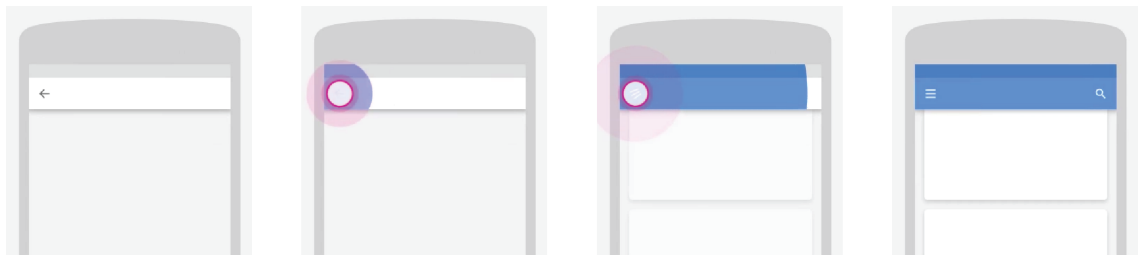

Figure 30.   An example from Motion Design. The ripples are used to indicate that the icon has been triggered. Data gathered from material.io.

Another great usage of anticipation is progressive image loading. This term was introduced relatively recently. Progressive loading is used when image content takes long enough to render on the screen. Thus instead of an actual image, its space is occupied with a blurred version of it, which progressively becomes a crisp image. This action prevents a layout shift when the image is fully loaded. Material Design calls it "Layout awareness", where sufficient space is created in the location where the element should appear. Google's Material points out that to avoid layout shift and user frustration there should be a space reserved for unloaded element.
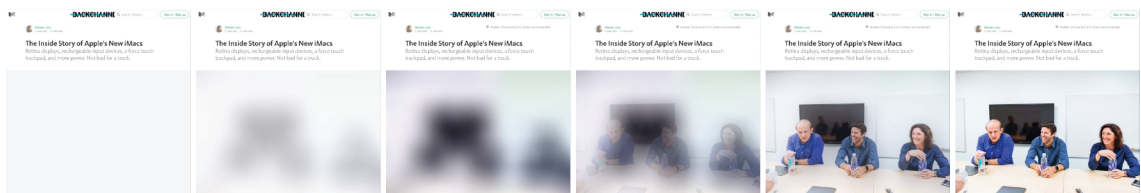

Figure 31.   illustrates how progressive image loading works on medium website. Data gathered from Pérez (2015).

3.5 Follow through and overlapping action

Animation can show how elements of a user interface interrelate. Overlapping describes the offset between the movement of the key elements (in cartoons - body) and it's elements (in cartoons – arm, legs, hair, etc.). Follow trough refers to the way in which these elements continue to move after the key element stopped. This creates a more natural visual appearance of the digital service.

Figure 32. When the core body start moving its parts move with their own speed. After the body stopped its parts are still following the force of moving, swinging after forward and backward before stopping completely. Data gathered from Lodigiani.

This has also a great performance advantage: it is faster to load elements starting at a different time than altogether. As Val Head mentions, offset impact the rendering performance positively. (2016, eBook)

Another use of this principle can be found in parallax effect. The effects is done in a way how people see real object when moving: closer objects move faster that further. When using the same principle on web, user's eye catches faster moving objects earlier than slower moving. If done right, those fast objects have more importance; they can be headers when slower objects can be background having a supporting function. This may vary depending on the case.

Figure 33.   When the main screen appears, icons move faster than the labels.

3.6   Secondary Action and Timing

Very similar to Follow Through and Overlapping, Secondary action is like a magician's trick, showing only what you need to see and hiding elements which are not so important. Like in staging, where a user has to find an anchor object to concentrate on, secondary action helps to focus on essential parts of the screen reinforcing the main action. The key to secondary action is that it should emphasize rather than take attention from the primary action (Oliynyj, 2016). The difference of Secondary action and Follow Through and Overlapping is that the later follows the same animation with a small delay and the former has its own sometimes different from the main object animation.

Figure 34.   The movement of the main object is supplied with its co-object, adding more character to the whole scene. Data gathered from Lodigiani.

Timing is the most important principle of animation. In traditional animation timing was about how make frames a certain action was taking, in digital world timing indicates how many milliseconds it takes to complete the action. This could be the most important element in animation that makes it look realistic. It helps to define physical characteristics of an object and avoids mechanic visual appearance and all the other principles will not work if the timing is wrong. Timing adds dynamics to the scene. Although in "Illusions of life" the principle is described just as timing, now it is more often used as timing and spacing, because these two dimensions work along. Together with easing, timing defines the charisma of animation. There is a very thin line between short timing and long timing, and it is always individual to a certain scene. Wrong timing shows low service quality to users. Users feel confused and lack in information exposure gives them a feeling of uncertainty, increasing the chance of leaving the service. Long transition exposure creates unnecessary lag and becomes boring for users with short attention span. Thus people become distracted by other things and miss crucial information.

More about timing is discussed later in the chapter 4.

3.7 Exaggeration

Exaggeration is used to create the effect of emphasizing the action, push the movement further thus increasing the impact on the viewer. Often it sets the animation apart from realism. In traditional animation it is popping eyes indication character's excitement or enlarged object signifying the distance between the object and the character. Exaggeration is more about clarity in pose and convincing the idea.
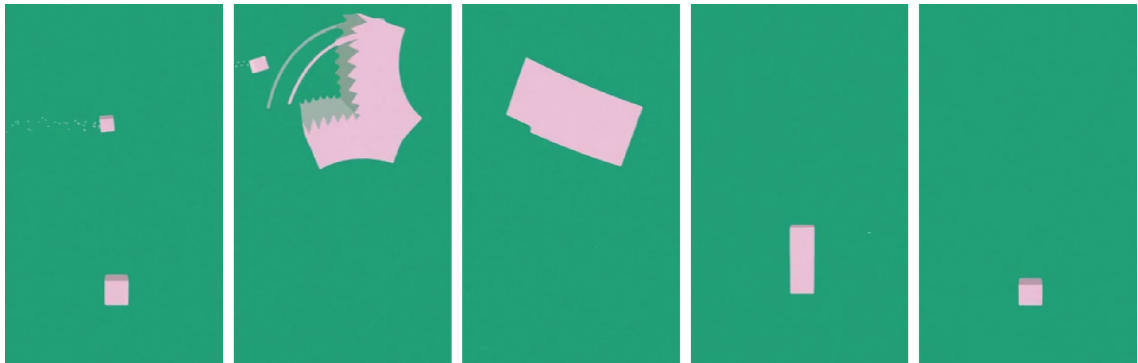

Figure 35.   The main object, a bottom box, suddenly transforms into the big toothy container, amplifying the action. Data gathered from Lodigiani.

Rachel Hinman in the article 'A New Mobile UX Design Material' explains, "An animation without some level of exaggeration might look accurate, but will likely feel stiff and mechanical. Mastering this principle involves identifying the relevant design element, figuring out how that element moves, and then tweaking the shape, scale or composition of the element so that it reinforces the movement, while adding a layer of drama. Exaggeration does not necessarily mean extreme distortion." Nevertheless, exaggeration should not be applied to every motion and should be used selectively and carefully.
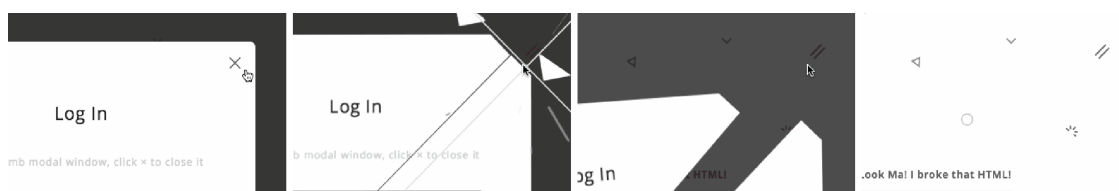
Figure 36.   Closing window. Data gathered from UYI (2015).

3.8 Solid drawing

Solid drawing is a basic material principle. Alike to physical objects existing in three-dimensional space, having volume and weight, there are rules for animating digital elements in virtual environment. In the UI world these concepts should be followed to create clearer relationships with users, making them easier to relate to. It especially applies to such elements as buttons, input fields or triggle states. Apart from other real estate on the displays these elements

should be obviously stated that they could be triggered. Historically the evolution of UI went from Sceumorphism, Realism, Flat design and eventually Flat2.0. (Meyer, 2015) As we have x, y and z axes, lights and shadows in real world, material designs uses them in implementations to create purposeful brand experience. This leads to natural movements explained in principles above.
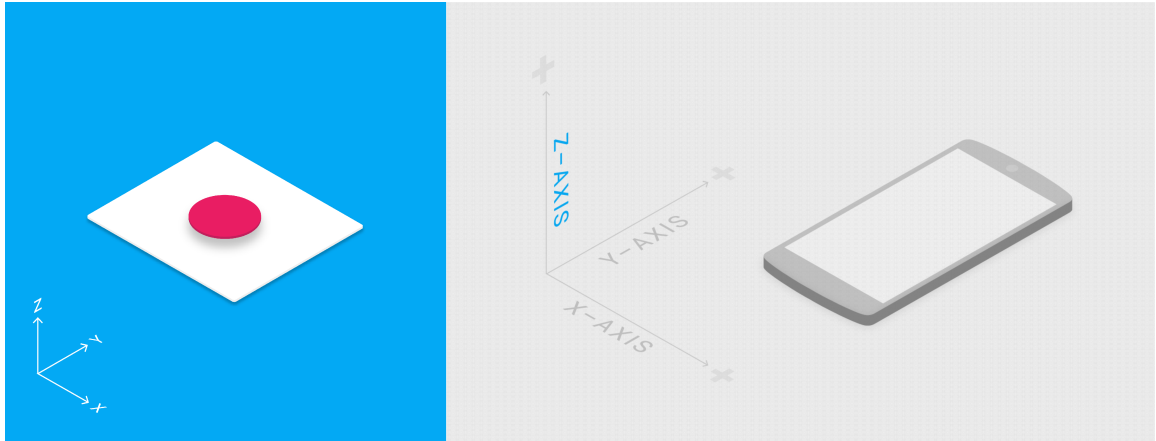

Figure 37.   The material is grounded in tactile reality, inspired by the study of paper and ink, yet technologically advanced. Data gathered from material.io.

3.9   Straight Ahead and Pose-to-Pose, Staging and Appeal

In traditional animation there are two ways how drawing is done. Pose-to-Pose is a method where key poses of objects are first drawn, after that the middle key frames are filled. It gives more control over animation on timing. Straight Ahead is more of a freelance way to draw: starting from the first pose and drawing frame after frame, an animator might get new ideas or sometimes unexpected diverse poses as he reaches the end of the scene.

In UI world it translates in coding. When working on transitions a developer can put important keyframes letting the computer do the rest. In order to get a distinctive and standing out transition a developer needs to draw straight ahead, changing the parameters frame by frame.

Staging is a very important aspect to consider both in traditional animation and UI animation. It is about emphasizing a central idea in the scene. A well-staged scene guides viewer's eye where it should be looking, without missing important events. In each UI scene there should be an anchor helping users understand important elements on the display eliminating confusion as well as giving a possibility of closing the service. In 'Highlighting the important elements' subchapter staging is related to composition and salient points.

Appeal is not about functionality; it is about look and feel. It is a face of your product. It is about standing out and feeling unique. Mostly it is the part where people decide whether they will use your product or some other one. Appeal is

why Macs with a smiling face on their screens were more popular over PCs, because their design had stronger effect on emotions. Beautiful custom-made transitions attract users on a subconscious level. Nevertheless appeal should be used carefully in order to provide the main objective to the client. It is talked more in chapter 4.

3.10 Conclusion of Disney Principles

Disney's animators developed these principles to make the cartoons feel more realistic, furthermore they created their own cartoon world where some movements would never have happened in the real world. Exaggeration is a perfect example of it: in real world eyes don't pop out of sockets how it is done in cartoon world or when a character jumps out of the fill it doesn't stay in the air for several seconds.

Nowadays there is a rush on Disney principles being used in digital services. But there is one important aspect to note: Disney (Pixar, DreamWorks) creates animation for entertainment and delight, where digital products/services are created to deliver information, with an exception of entertainment games.

The so-called 'Disney' UI animation promotes the idea of amusement slowing users down. As mentioned earlier, UI animation should be clear and subtle. In my opinion, only parts of Disney principles can be applied to UI. The field of motion design in UX is still in its early stages and will develop further, thus I wouldn't recommend blindly copying to all principles, but instead using them as a support to bring the digital world of website and apps closer to real world. The principles should be used carefully, following the guidelines discussed in the next chapter.

4   Guidelines of animation. What to consider when designing for UX

People do not notice it when it works properly, but understand its importance when something goes wrong. Good animation is hardly noticeable, as it is one of the primary missions. Bad one, on the other hand, provides an impression of poorly developed product/service. With the available technology, everyone can create an app or a web product. This leads to messy designs and repulsive experience appearing more often. Somehow people think "if I know how to make animation, let's put it everywhere I can". But it is not true. The main purpose of animation is to support the key idea of the product, while not interrupting attention. When traditional animation is used for amusement, UI animation is used for creating a better user experience. As Molich and Nielsen developed ten usability principles (Molich, Nielsen 1990, 346), there have to be rules in using animation as well. There are several aspects one should consider when designing microinteractions. These aspects can be categorized into three groups:

Layout
- Avoid clutter
- Keep consistency in motion design style
- Use appropriate colour combinations

User action
- Do not distract from important animation
- Associate animation to the action
- Use appropriate exposure duration
- First time usage
- Entertain the user while waiting

 Brand
- Make animation a part of your brand
- Innovate

4.1   Layout

- Avoid clutter: use animation only when it is needed.

As Sophie Paxton mentions, it's only natural that designers initially abuse new capabilities before a more sophisticated design language evolves. There are no strict guidelines yet of what the exposure should be, still when users look at cluttered displays they often miss the main message, thus disconnecting from the product. "*Don't use animation for the sake of using animation*" – Apple Inc. According to Woodruff et al (1998, 62) 'clutter in visual representations of data can have negative effects ranging from decreased user performance to diminished visual appeal.' Overusing the animation flattens hierarchy and dilutes the message. One should remember to animate with purpose. It is always good to remember that in regards to animation less is more. Following the KISS (keep it simple, stupid) principle transitions should be clear, simple and coherent. As Michaël Villar (2014) says "*If you disable animations, the flow should feel broken; if it is not, this might mean your animations are superfluous.*" As shown in fig. 40 nice sleek animation is not necessary in that case. Although the animation itself is really nice, it obscures the main action of showing menu items. Material design interprets it as not to distract attention from the focus element (fig. 38).
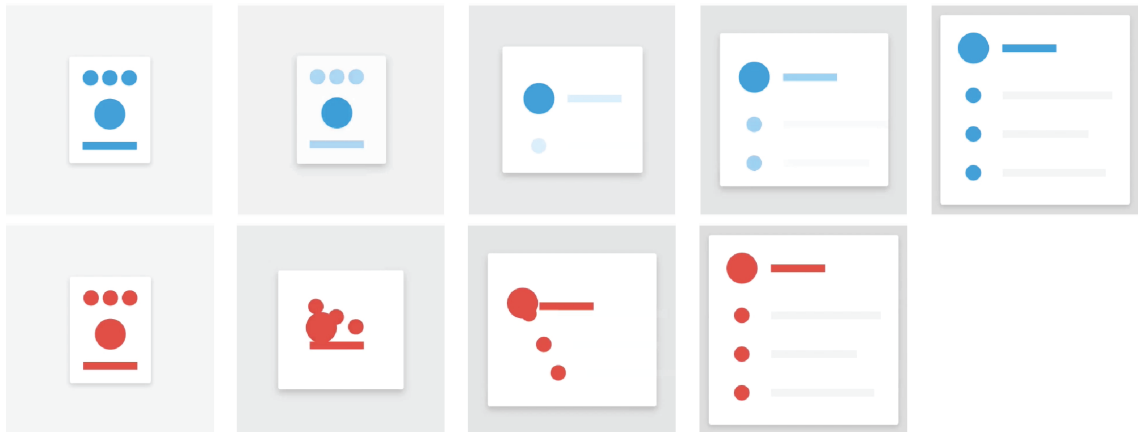
Figure 38.   Material design avoids creating messy scenes where it is difficult to focus on a key element. It gives a good (top) and bad (bottom) example of using the animation between two states. What materials shows is the focusing on a key element is important and it shouldn't be distracted by other elements. Even if the same elements are present in the next stage, if they shouldn't confuse the user by crossing paths with the main element. Data gathered from material.io.

- Keep consistency to the motion design style

Many of the transitions are well known for the user, there is no need for 'inventing a wheel'. The law of similarity tells us to keep the animation consistent. Like a ballet troupe practices its movement together and in conjunction with the whole performance, UI animation must have its own choreography too. (Head, 2016, Ebook) iOS HIG states that a familiar, flowing experience keeps users engaged. Meaning if one transition combination is used for the action, repeating throughout the session, a developer should stick to it. Also, if 'opening' action is showed appearing in the right direction from the left, the 'closing' animation should be obvious to the user as swiping back to left.

It also covers the most common switchable buttons: play/pause, menu/go back. Blending in one entity into another one signifies that the actions are linked. Smooth animation enriches this connection.

- Use appropriate colour combinations

In our human perception we associate colour with certain emotions. Red: a feeling of danger and fear. Orange: warning. Green: allowance and safety. Blue: notice. Other conventions associate green with nature, red with heat, black with death. (Aslam 2005, 21) A bad colour combination can potentially deliver preconceived ideas, a proper one helps user in understanding the message. As Daniel Kahneman says in his book [Thinking, Fast and Slow], there are two ways of thinking: "fast" and "slow". The "fast" thinking doesn't take any effort to interpret information; it is an intuitive way where users get it automatically and quickly. Usually this way is composed out of people's previous knowledge and experience. The "slow" one involves complex mental activities. The designer's

goal is to activate the "fast" thinking, hence making engagement with the product fast and easy. This includes using familiar colours, objects, etc. Although here we should note that colour shouldn't be the only trigger, as for example in an error message case. As Jakob Nielsen says "*this violates one of the oldest and simplest rules for making technology accessible to users with disabilities*". Therefore another way of highlighting an error message should be provided, that colour-blind users would notice. (Nielsen 2001)

4.2   User action

- Do not distract from important information

In most of the cases animation should be created to complement the mobile experience, not to be the star. It should support interactions without detraction or confusion. Excessive over-the-top animation can destroy a perfectly good mobile experience. In iOS Human Interface Guidelines they note that animation that seems excessive or gratuitous can obstruct app flow, decrease performance, and distract users from their task (Apple Inc., 2014). It is always good not to let animation get in the user's way. Secondary action can be interpreted here by saying: make the main action case of attention, animation can only support it.

One of the aims of interaction animation is a user trigger. An optimal response time between a user input and action is 0.1 second (Nielsen 1993, 135). Then users feel likely that their actions directly caused something happening on the screen.

- Associate animation to the action

In Interaction design a Gestalt law of similarity, proximity and common fate is often used. The law of proximity states that objects that are near one another in space or time are perceived as belonging together. The law of similarity states that objects with similar characteristics such as form, colour, size and brightness are perceived as belonging together. Animation is an interaction. In most of the cases it is caused by a trigger: tap or click. When users' attention is focused on one part of the screen that is where the animation should be. People have the so-called "foveal vision", a 1.5-2° circle of focus (Strasburger, Rentschler, Jüttner 2011, 13). If animation is happening on the other part of the screen, a user is likely to miss it. Animation should appear from a triggered object. There should be a logical connection to help a user comprehend the change. Like in Material Design, a triggered button leads to the opening of a surface, which appears from the icon, giving the perception that these two objects are connected and moreover that one is cause by another (fig. 39).
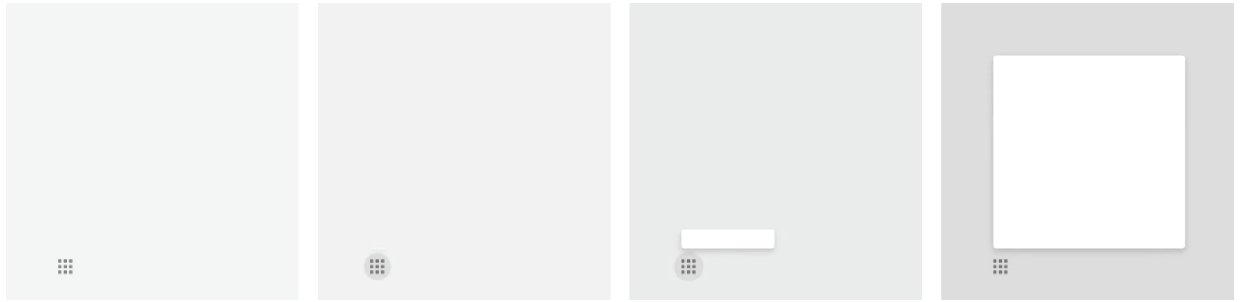
Figure 39.   A new object opens up coming from the triggered menu button, giving the connection between these two elements for the user. Data gathered from material.io.

- Use appropriate exposure duration

One needs to carefully consider the style, amount and timing of motion in relation to the other elements of interaction design. Disney's timing and easing are considered in this case. But even learning and mastering these rules it is needed to understand how to use the guidelines and to which extent. For example, "ease-in" means the animation starts at a slower speed, no matter what the total duration is. This can make the animation appear to take longer or hesitate before it reacts. This feels sluggish and can cause confusion: "Was that thing I clicked on a button or not?" Rachel Nabors recommends simply avoiding "ease-in" easing for timing functions on button-like elements. In Disney timing principles, duration is very important for the animation. Too short exposure might get users confused, a long one gets them bored. Jakob Nielsen deconstructs user perception of response time. He suggests using time in range of 0.1 second to 1 second for the animation to happen. 0.1 second as a response time is perceived as instant to the user where 1 second is considered the limit. It takes 230 milliseconds for the user to visually perceive something. Paul Lewis from Google Developers says, that typically transition within the region of 300 milliseconds and 500 milliseconds is suitable, but it depends heavily on the feel of the project (Lewis 2017). Animation should be done quickly so that the user doesn't have to wait for it to finish (fig. 40). "*Keep transitions short as users will see them frequently*", declares Material Design. Although sometimes it comes to the ratio of the object to the speed. Complex animations need more time to be able to read. As Val Head point out 'it may need only 20ms-30ms more, but that can make all the difference between an animation that looks "broken" and the one that looks like it bounces.' (2016, eBook) Usually the try and test method works best to craft a well-balanced animation.
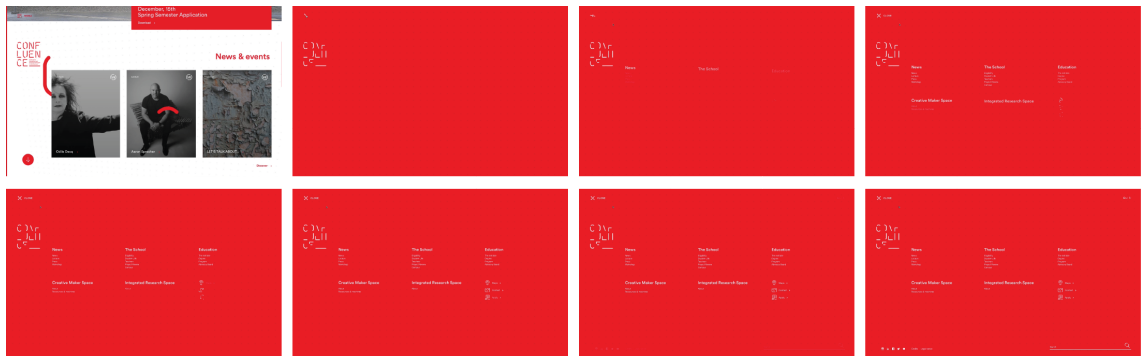
Figure 40.   A bad example of using a nicely crafted animation for the navigation bar (www.confluence.eu). Sometimes it is not the place to show nice transition. User can get frustrated while waiting long enough while the whole space is loaded to be able to see all the sections.

- First time usage

One of the roles of animation is delight, but after sometime delight might turn into annoyance. It is needed to clarify that the discussion in this subchapter touches only animation, which doesn't have any other function than entertaining. Delight is created by an element of surprise, but executed not carefully will affect user experience. A user might be happily shocked to see a custom crafted animation, but the animation starts feeling stale after a while loosing its charm.

Delight has so-called 'shelf life'; it is transient decaying over time. (Saito 2016) As suggested by John Saito there are special occasions where delight can be used:

1. When an app is first launched.
2. When they finish setting up an account.
3. When a new feature is introduced.
4. When they complete an important action for the first time.
5. When there's an empty state.

- Entertain the user while waiting

Even in our fast speed world, we have to wait for something loading. One part of showing a progress bar is already helpful enough; it would be more fun if the users were entertained by some funny animation. As children are glued to the TV screen watching cartoons, we are captivated watching small cute transitions on our display. Sometimes it takes loading process long and one way to distract user is to show not only a progress bar but also an attractively crafted animation. Here the delight principle can come in handy: fine animation can distract a user and make him ignore long loading times.

Nevertheless it is not a case for making a progress bar scene lasting longer. This principle goes together with the previous one and forms one rule of thumb: put animation only where it is needed.

Figure 41.   Example of a loading page from anywayanyday.com website. It takes time of searching for tickets, but the loading process is compensated by a nice animation of a plane following a mouse cursor, diverting user's attention from unpleasant waiting. 'Filling' the world map with blue colour indicated how much content is loaded and gives some timing scale for the user.

4.3   Brand

- Make animation part of your brand

There are all sorts of animation varying from business-like style to cartoonish and childish one. One should carefully choose the appropriate style. Together with copy text, colour scheme, etc. animation can be unique for each product, giving it a hint of personality. Appeal and delight are core references here: people can connect more with a product if it stands out, if it is distinctive. Animations add life to any design, engage users in even the most routine tasks, and of course make products stand out from above the crowd. As Charles Eames used to say "*The details are not the details. They make the design.*" Your product is composed from many small details that form one user experience. Everything should be built in one system: graphics, fonts, and colours. Animation shouldn't go further from the later ones. This leads to the necessity to know the target audience. It is mostly effective to do the homework and study demographics characteristics of potential consumers, such as age, income levels, religion, educational level, etc. Everyone knows facebook 'like' button. In addition, it can be changed in size, depending on the holding time, when sending it to another user via Messenger app. One can choose the size of it by pressing and holding the sign icon, whereas it is expanding in a funny matter. The whole principle to choosing the size of the icon is supplied with the nicely crafted animation creating the appropriate feeling.

Figure 42.   A little detail adding a customized character to the user experience. Not only a user can adjust a size of 'thumbs-up' icon, it animates in a funny bouncing matter.

- Innovate

Henry Ford's most famous innovation adage captures it best—"*If I had asked people what they wanted, they would have said faster horses.*" People are not aware what they might like in future. You need to give it to them.

If we look at the development of UI animation from it's early to recent days, it has gone from its absence to moderate use, to high use during the skeu-omorphic design period and finally to being minimalistic and purposefully de-signed these days. It is important to meet the deliverables, but on the same side it is important to play and innovate. Customers sometimes are not aware of their desires; they can be positively surprised when seeing a new feature.

5   Putting theory into practice.

In this chapter I will talk about the previously mentioned laws of motion and how I put them together in action. The key point was not to force all the principles to the animation I was creating, but to understand what to use and why to get the best result. The software I used for creating animation were Principle for Mac and After Effects. Principle is a good tool for creating and testing the flow of an application, by interacting with a mock-up. After Effects is a standard program for creating motion graphics, it gives a lot of freedom in making custom animation, however it doesn't have an option for testing.

For my practical part I worked at a company called Sonera, which was in the middle of rebranding. As part of the transformation, a new app was developed, where my role was to create the motion language. In the beginning of the process I was given several storyboards and a complete skeleton of the app. After getting familiar with the app system, I evaluated it's structure and pointed out several key moments:

The company wants the app to be perceived as modern, fresh and highly practical. Creating an appropriate custom animation is an efficient way to keep up with newest trends and be up-to-date.

The design of the app follows specific patterns, which are established in the brand book. Animations should go together with a bold vivid colour scheme and a new font type. Using the appropriate animation should complete the whole look and feel of the product.

Most of the functionality of the app works in the offline mode. Yet some needs to be loaded from the Internet. This loading can take some time, when animation can be used to provide users with feedback.

The app has a chat bot, a personal assistant that helps to interact with the system. It is strongly present throughout the workflow, eliminating forms and complex step-by-step processes. Use cases include changing dates, welcoming new users and guiding them through the login process. The chat bot is an artificial intelligence program designed to behave in a human manner.

5.1   Chat bot motion design.

The chat bot takes a significant responsibility in assisting the application's UX. The main objective for it was to make it behave as a person, giving users trust in handling their tasks. The first time a user meets the chat bot is the onboarding process. After the first welcome screen is loaded, a window appears to greet the user and offer the options to log in with. As a part of an obligatory "Read and agree with terms and conditions" page, the chat bot presents it in a form of a dialog.
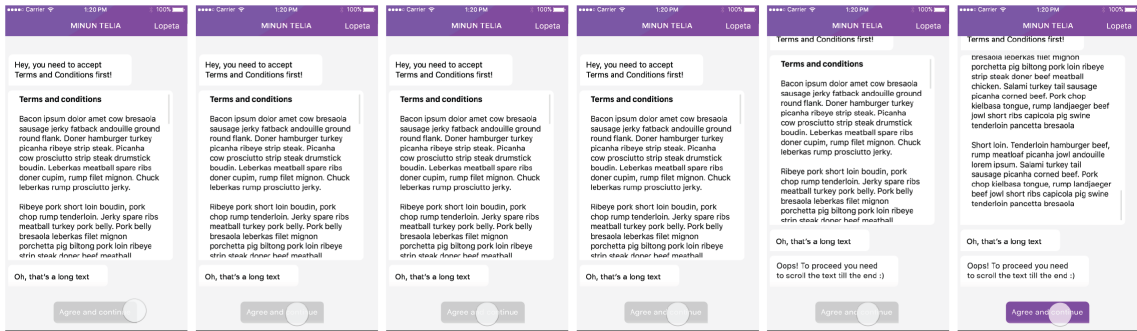
Figure 43.   The app uses the chat bot with the conversation instead of default form/page process. A user must read (scroll) Terms and Conditions till the end of the bubble, otherwise the process can't go forward. The first indication of this is a greyed button, which becomes purple (default state), when the users reads the bubble, the second indication is that the bubble shakes in 'no' movement (x-axis) to show that the user can't proceed following by a new bot message with the tip.

The conversation is done in a familiar 'bubble' routine, where the bots messages are on the left side and users are on the right. Although the bot's messages were already predefined and could go on the fly, it was helpful to give it time to write a message, mimicking a real person conversation. As shown in Figure 2 of the Facebook app, the running dots indicate a typing process; the chat bot uses the same process to write a message. The anticipation principle is strong here: it gives a hint that something is about to happen, preparing a user for action. The Disney's principles of timing, staging and appeal were often used too. It was crucial to show the bot typing and balance the time of typing so that the user won't get bored. Staging is applied to the way how the bubbles appear and move in the real estate, making it familiar to the experience of chatting with a friend. Appeal gave the final touch in the bubbles' behaviour.
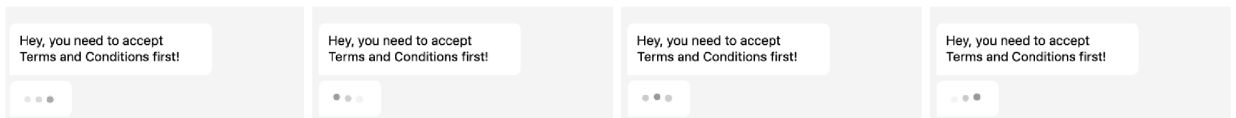

Figure 44.   Typing animation from a chat bot gives a more humane approach, mimicking the bot taking time and actually typing the words.

Being an artificial intelligence, the bot is not able to handle a real conversation, thus all the users' answers were proposed in a form with pre-selected options in the shape of messenger bubbles. I eventually came to the conclusion that the guidelines 1, 3, 4, 6 from chapter 4 were the most applicable. There is a specific element in the bubble's motion design, where all users' option bubbles are aligned to the centre, making them visually neutral and open to choose from. After a user makes his/her choice the bubble takes the right side on the display signifying the users input. In the first attempts the bubble moved straight to its

destination in a linear way. After several testings the bubble movement has changed to a circular path, adding an organic feeling (see Arcs from Disney principles). This experientially proved the Disney principles to be applicable and efficient.
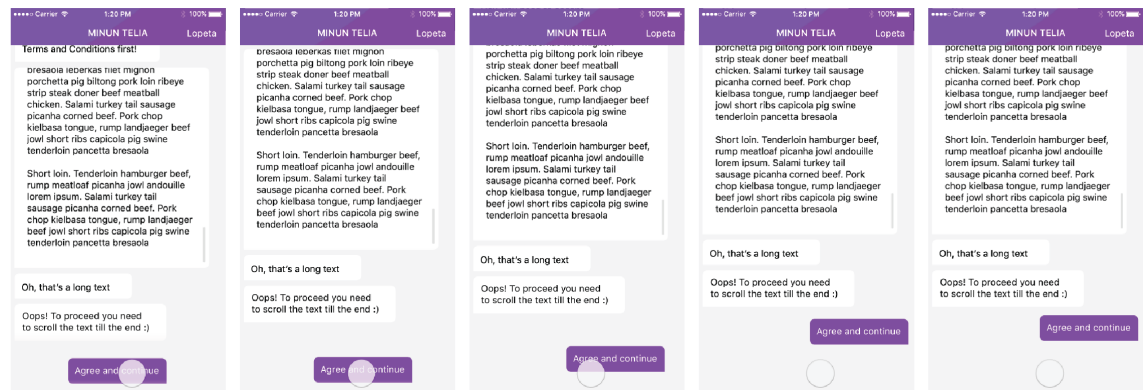

Figure 45.   When the user selects the answer, the bubbles flies from the centre position to the right side following the arc movement. The movement takes around 560 ms.

5.2   Scrolling list motion.

The app has five major sections. The second section called "My Subscriptions" is designed in a list-from. The list is divided into sections with a headline in each. Animating text headers helped to fit longer information into a limited space of a mobile screen. When a header approached top of the screen, it scales down eighty percent and 'sticks' at the top of the page being present until the last list option is visible. This is done for better understanding of structural model of the page.
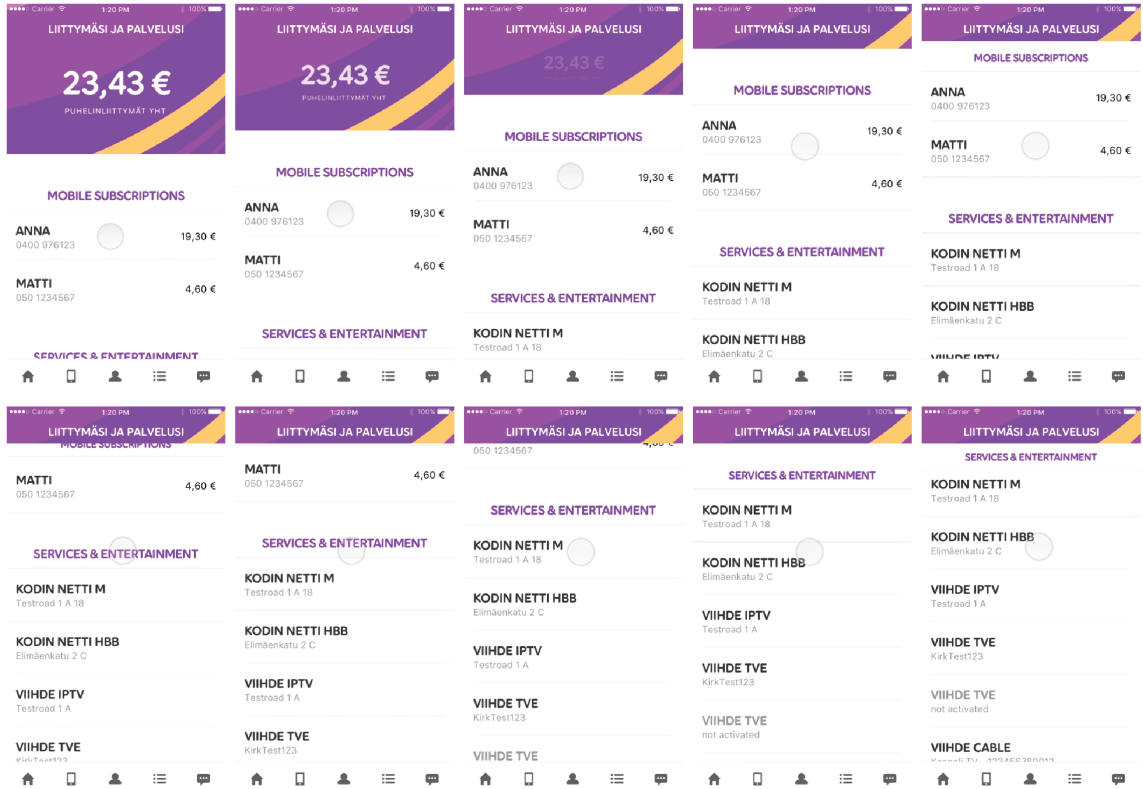
Figure 46. To save space when moving section headers scale down, staying visible until reaching the last child-section and them moving with the list. Header ripples move as well, more about them be in the Ripples sub-chapter.
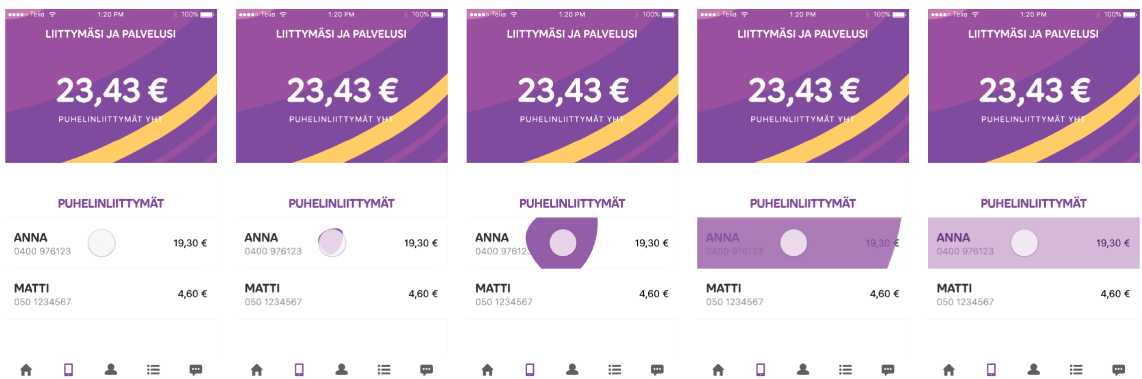
Pebble form.

Figure 47. After the user's tap, a ripple feedback is animated as an affirmation that the section has been triggered.

Sonera's logo has a shape of pebble, which I have applied to motion design in a number of ways. I used the same pebble shape for providing feedback to a user's tap. It gives an affirmation to an action while keeping the brand consistent in visual language. The pebble shape is also used when switching between five main sections of the app.

5.3   Ripples.

In the first case, the list represents an accordion – when a user selects a section, the list opens up revealing the section behind its name. The motion resembles this movement helping users to understand the action. It is constructed in a coherent and uncluttered way, joyfully easing from initial state and reducing users cognitive load. A new page appears from the triggered part helping to create a mental model of the pages connection. Header ripples follow the motion in a parallax way adding a small touch to the transition (Disney's delight principle) transforming the pages from static to dynamic.
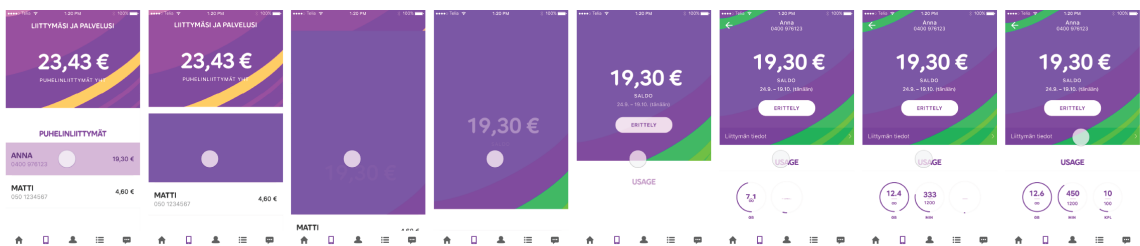

Figure 48.   The ripple header is used in the majority of the screens. Animation has been applied to the ripple header in two cases: screen transition and pull-to-refresh animation.

The ripple elements are taken from the logo and play a significant role in the app's overall design. In this case adding motion to them doesn't have any practical use but to define and enhance the app's character, which corresponds to the Disney's Appeal principle. It is done by following the guidelines mentioned in the chapter 4: the motion as a part of Sonera brand adds a distinctive value to its character; the motion is clean and consistent and doesn't distract users from the main content; the transition is fast and doesn't take heavy attention. The average transition time is around 400-600 ms; the timing was calculated based on the speed and the feel of the movement.

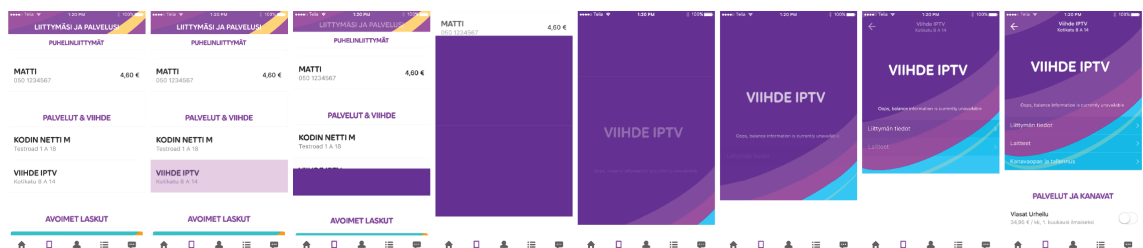Figure 49.   shows an example of the accordion page opening. After the users select a section, the area below it goes down and the area above it moves up thus making the 'opening' effect. In the opening field a new page appears, followed by the movement of the up-moving area. The next page's content follows the movement slowly revealing itself. The timing is crucial here as the transition is done in a quick way not to get users bored.

The second animation of the ripples is pull-to-refresh. It acts as an acknowl-edgement to users' actions – the ripples move when the screen is refreshed. Ripples always 'react' on the scrolling, whether it is up or down. As shown in the fig. 50 below, when scrolling down ripples a-synchronically moving form the smaller header section of the screen.
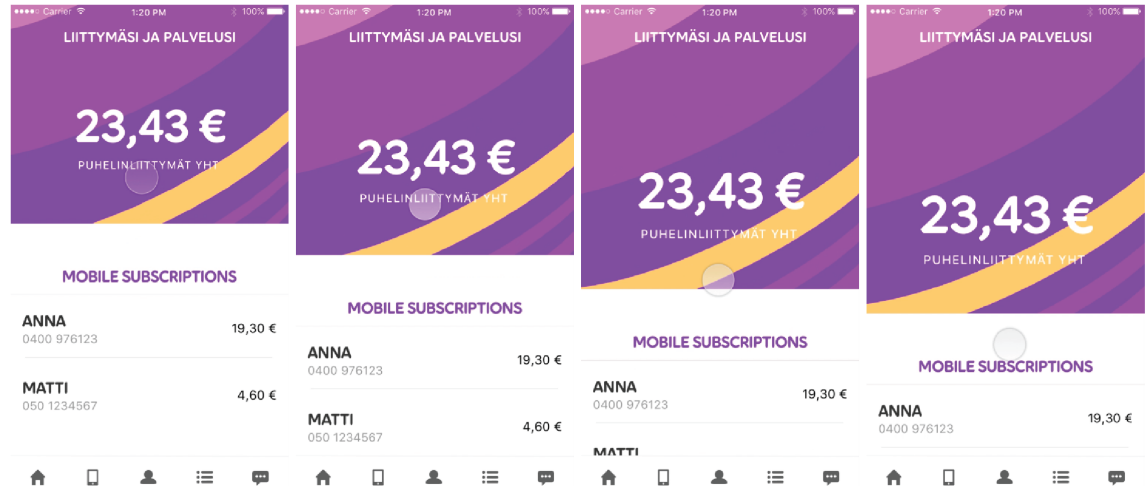

Figure 50.   The header ripples move in an a-synchronised movement when the users pull down to refresh the screen.

5.4   3d touch.

To be efficient and up-to-date, the app should take advantage of the new fea-tures as 3d touch. At the same time, a lot of mobile devices do not support this feature, so the challenge was to design an experience that would work both with and without 3d touch. The technology can help to reduce the number of steps a user needs to go take to achieve its goal. For example, there are story blocks in the feed section, where a picture and a header are visible. 3D touch allows a used to peek into the story without actually switching to the next view. The Disney's timing principle plays a crucial role in this case; if the user keeps force-touching the story, it expands into a full view. If the user doesn't want to continue reading the story he/she can lift the finger off the screen without press-ing back button. Animation creates a visual support to provide feedback and guide the user along the process.
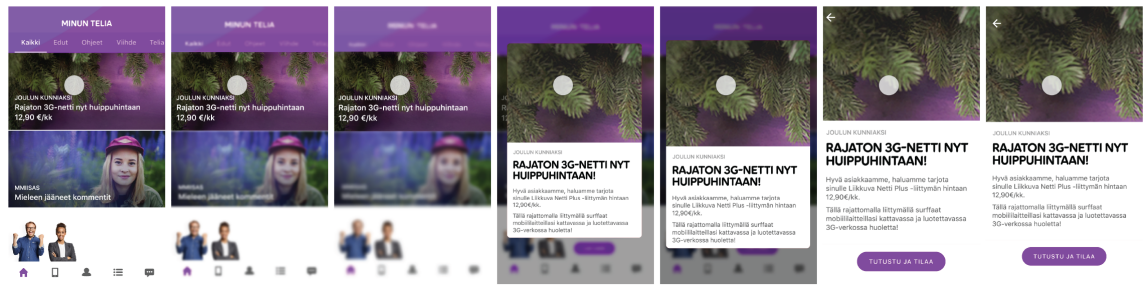
Figure 51.　New techniques as 3D touch allows users to peek inside the page content without actually opening it. It saves time in case if the users decided that he/she doesn't want to go forward. The picture shows the 3D touch action following by the page opening. If the user keeps holding long enough, the page finally opens in a full scale. Not very visible on the example, the animation of the opening page is inspired by the sea wave movement, slightly over scaling but returning back to 100% scale.

6　Conclusion. Future of animation in UI

Even though animation has existed for a long time and is now used more often in digital design, there is a big part of websites and digital services not taking advantage of it. More conservative and complex business such as universities, financial institutions and medical organisations are often not taking advantage of the newer web technology and trends, and do not adapt well to the fast speeding fashion of the Internet. When designing a product, animation is usually the last and most skippable part of the process. An obvious exception is the gaming industry. Motion stands together with colour palettes; fonts and copy of the product and in my opinion should be considered from early stages of sketching the product. The study conducted by Heider and Simmel in 1944 shows that animation has emotional response in the viewers, evoking certain feelings. Creating custom animations helps creating a certain character of the product, a stronger connection with the used and higher efficiency.

We saw in the change from skeuomorphism to flat design that some of the Disney principles have disappeared / are disappearing, leaning towards the minimalistic flat approach. Google Material Design, IBM Design Language and Windows 8 operating system are good examples of it. As in my experiment, such Disney principles as Arcs, Easing, Timing, Anticipation, Follow Through and Overlapping and Appeal are most applicable; on the other hand such principles as Straight Ahead and Pose-to-Pose, Exaggeration, Squash and Stretch are becoming obsolete.

In the time when users and devices are becoming increasingly inseparable and interaction design is growing rapidly, animation can open a window between touch gestures and actions on the screen and improve the interaction between humans and machines.

With the speedily developing technologies animation will not take much resources and power, it will penetrate the overall design. As the findings of my

case study indicate, motion brought more life into the app, helped test users connect the points between and made them engage more with the services. Nevertheless more animations could have been added but were omitted considering the functional side of the app, I was strict to myself while struggling with the wish to animate more objects. Knowing where the brand stands and its characteristic look and feel was a starting point which made motion language distinct and more sophisticated.

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