Chapter 2
Detecting Profitable Markets

In this chapter, we show how to detect profitable markets through the *Nintendo Wii* and *DS* revolution. The secrets of sound perception are unveiled with the example of *Shazam* and Dutch Railways (NS). We learn how to leverage sensory knowledge in order to identify profitable markets, in the context of emerging countries, or disruptive innovations.

2.1 Introduction

In this chapter, we find out how to detect profitable markets. We start in Sect. 2.2, by wondering what makes a market more attractive and illustrate this with the sound system case. In Sect. 2.3, We dig into the world of music and learn about consumers' preferences and sensitivities. In Sect. 2.4, we make the link between sensory perception, sense of danger, and the immune system. This will not only help us design user-friendly products but also, as we study in Sect. 2.5, spot great business opportunities (Fig. 2.1).

2.2 What Makes a Market More Attractive? The Sound System Case

Let us see with the sound system case what makes a market attractive. The role of product superiority and competitive benchmarking is reviewed. We also explore consumer barriers and motivations, and why market seizing exercises often go wrong.

D. Derval, *The Right Sensory Mix*, DOI: 10.1007/978-3-642-12093-0_2,
© Springer-Verlag Berlin Heidelberg 2010

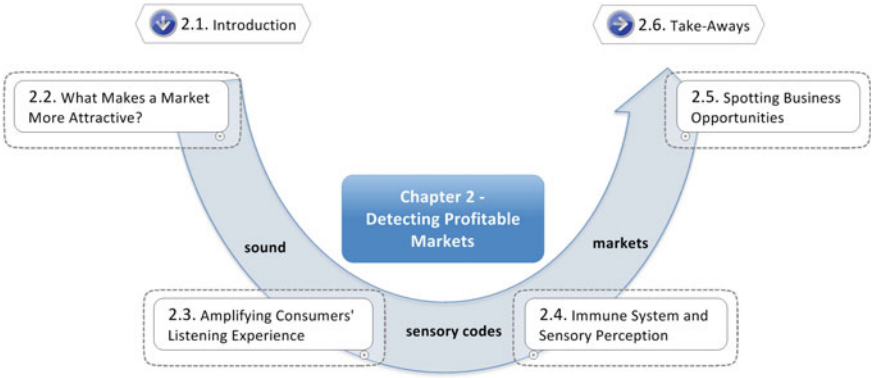

Fig. 2.1 Content of Chap. 2

2.2.1 Product Superiority

My sensory journey brought me to the music industry. Our mission was to help adapt sound systems for different target groups. The big disparities among consumers but also between countries, heavy R&D investments, and a fierce competition presented a challenge.

Music format moved from LP to CD to MP3. Everybody considered this shift as a great improvement and immediately embraced the iPod. Almost everybody—some 'audio-nerds', fascinated by sound reproduction, were still resisting, claiming that the quality of music has been downgraded. This was worth an ethnographic study. In interviews, they reported following disgraces:

- CDs introduce harmonic distortions and limit the dynamic range you can find on LPs—the example of Metallica's "Death Magnetic" is often cited (Anderson 2007).
- MP3 took the horror further by plucking notes out of CDs to make them fit in a file 10 times smaller. The 'perceptual coding' used is supposed to remove only sounds not perceptible to human ears (Jayant et al. 1993).Which humans? Which ears? Those are exactly the questions. What we found out, and will share with you throughout this chapter, is that all ears are not on an equal footing.

2.2.2 Competitive Benchmarking

All companies cannot be as focused on their target consumers as *Apple*. *Creative Labs* was for a long time reluctant to switch to MP3. They put themselves in a very difficult position but somehow bounced back with their Zen range and attracted many of the 'audio-nerds' of the market, enjoying the file formats available—including FLAC (Free Lossless Audio Codec) an alternative to MP3 that combines

fidelity and compression—and other compatibility benefits. Then suddenly, *Creative* launched an iPod clone. Busy copying competition, they left out critical features, upsetting their consumers as we can read on the blog of a Zen fan: "*A device that synchronizes with the PC, not with Bluetooth or Wi-Fi, but with a god fricken cable! What year does Creative think this is?!*" (Dvorak 2009). Benchmarking competitors can lead to wrong positioning if the target consumers are different. Also, it is not an issue if many people dislike a product as long as the existing consumer base still loves it.

2.2.3 Consumers Barriers and Motivations

If we observe iPod users, we understand that their motivation is to enjoy music on the go, while running, doing fitness, or waiting for their train. At home, they have more options. They can listen to the iPod with a practical docking system, switch back to their CD collection, listen to music from their computer, or turn the home theater system on. At home, they also have more constraints. Consumers might have to cope with other family members' desiderata or with neighbors' feedback on their music.

Many men are for instance trying to sneak a home theater system into their home or on the wedding-list, and are facing objections from their wife or future wife (or ex?) because it would not fit nicely in the living room or be too loud. Adding, that she already has to constantly put the volume down!

The dilemma is to satisfy not only the purchaser, or one user, but the whole household. Like in business to business situations where you have to map the purchasing center with the stakeholders—it is critical to identify your champion, here the man, and to provide him with the needed objection-handling script. What he does not suspect yet is that his wife is not putting the volume down just to be annoying.

Did You Know? Noise and Snacking

Research shows that women exposed to stressful noises tend to eat more sweet and salty food (Cousino Klein et al. 2004). No wonder that movies are so loud and popcorn so popular in movie theaters. You can help your wife lose weight just by putting the volume of your sound system down!

2.2.4 The Valley of Illusion

High R&D cost calls for scale saving. You start by then considering new consumer target groups or new countries. Adapting a product to other customers or countries is a stressful process. Whether the existing product is a top or a flop, the key is to understand why. A common pitfall is to consider the potential market as being infinite. In our example, it would be anybody with ears and a wallet. As we saw

earlier, some consumers are just not interested in a product whereas others would be ready to sell their mother—let us say their mother-in-law—to get it. Evaluating the attractiveness of a market based on the number of people who consider it as a 'must have' rather than a 'nice to have' has proven to be a very reliable approach, as we will discuss later in this chapter.

For now, we still have to understand why some people put the volume up and others put it down when listening to music.

2.3 Amplifying Consumers' Listening Experience

Let us have a closer look at how our ears work, and see why companies taking into consideration consumers' listening experience are so successful, with the cases of *Shazam* and *Dutch Railways* (*NS*). This will help us evaluate the market attractiveness for sound systems, games, music instruments, ringtones, and make the most of ambient music.

2.3.1 The Secrets of Sound Perception

2.3.1.1 Hearing Spectrum

Sound is a vibration. The number of times a sound vibrates per second is called frequency and is expressed in Hertz (Hz). Loudness, also called amplitude, is a pressure of sound on the inner-ear, measured in decibels (dB).

The human ear can detect sounds between 20 Hz and 20 kHz. Elephants communicate in lower frequencies called infrasound. Bats navigate thanks to higher frequencies called ultrasound (Fig. 2.2).

Captivating, sometimes loud, surrounding, or in the background—sound is very present in our daily lives. When observing our various listening experiences, we can wonder if we all share the same perception of sound. Why, for instance, do some individuals listen to music with the volume up and others with the volume down?

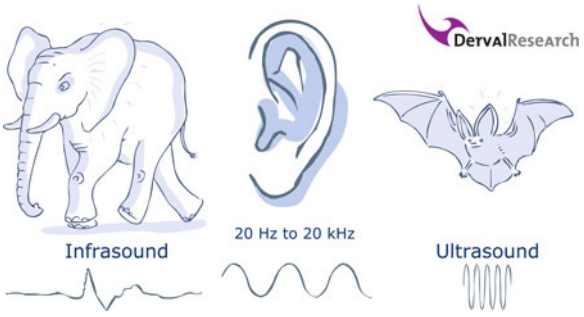

Fig. 2.2 Frequencies detected by human ear (printed with DervalResearch permission)

2.3.1.2 Otoacoustic Emissions

Twenty-five thousand hair cells, located in our inner ear, help us perceive sound. Each of their stereocilia captures and amplifies a certain frequency (Marieb 2007).

Haircells and stereocilia generate their own noise when amplifying sound. This noise is called otoacoustic emissions (OAE) and can be measured in the ear with a special microphone (Fig. 2.3).

> Did You Know? If Ears Could Talk
>
> Otoacoustic emissions are so unique from one individual to another that feasibility studies are conducted on how to use them as a kind of 'earprint' to identify consumers over the phone (ICBA 2004).

There are two methods used by professionals to assess the hearing spectrum of subjects:

- *Audiogram*: the audiogram is a subjective method for evaluating the hearing spectrum where the subject declares whether or not he hears each frequency played in a headphone. You can test your hearing with our audiogram at www.derval-research.com. Make sure you use a good quality PC sound card and headphone.
- *Otoacoustic emissions*: screening the otoacoustic emissions is an objective method that measures, thanks to a tiny microphone introduced in the inner-ear, how each frequency sent to the inner-ear is amplified.

We decided to validate our hypothesis that some people amplify sound much more that others on 16 Caucasian men in their thirties with no reported hearing issues. We measured the otoacoustic emissions of the 16 volunteers, with a clinical OAE reader provided by Interacoustics, and asked them among other questions (like their favorite music instrument, where they sit at the cinema, their job and hobbies) which sounds they found particularly disruptive (Table 2.1).

We found out that:

- *A same individual can amplify differently bass, speech, and high-pitch sounds*. For instance subject 16 (S16) hears much better high-pitched sounds than speech.

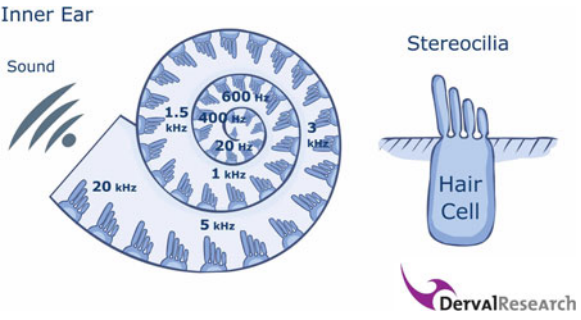

Fig. 2.3 Haircells and stereocilia (printed with DervalResearch permission)

Table 2.1 Otoacoustic emissions variations among individuals (Derval 2010)

Subjects	0.7 kHz Bass	1 kHz	2 kHz Speech	4 kHz	6 kHz High-pitched	10 kHz	12 kHz	Disruptive sounds
S1	−1.0	8.0	26.0	19.0	16.0	23.0	−1.0	Baby
S2	1.0	7.0	17.0	20.0	19.0	12.0	10.0	
S3	2.0	4.0	23.0	21.0	17.0	18.0	4.0	Plates
S4	5.0	14.0	26.0	24.0	23.0	10.0	12.0	High-pitched sound
S5	0.0	8.0	16.0	23.0	21.0	−1.0	6.0	High-pitched sound
S6	−1.0	3.0	4.0	10.0	15.0	16.0	10.0	Train
S7	7.0	1.0	24.0	16.0	22.0	22.0	11.0	Too loud bass
S8	9.0	17.0	31.0	23.0	24.0	20.0	17.0	
S9	6.0	−2.0	12.0	13.0	14.0	0.0	11.0	
S10	9.0	8.0	11.0	9.0	3.0	3.0	7.0	
S11	4.0	9.0	12.0	8.0	2.0	2.0	6.0	
S12	−1.0	6.0	14.0	14.0	6.0	3.0	6.0	
S13	0.0	8.0	28.0	23.0	25.0	38.0	6.0	Mosquito
S14	0.0	11.0	23.0	28.0	39.0	17.0	11.0	Baby
S15	11.0	6.0	17.0	16.0	32.0	16.0	21.0	High-pitched sound
S16	6.0	12.0	17.0	15.0	30.0	21.0	21.0	Klaxon

OAE measurements performed with an Interacoustic OtoRead clinical device by DervalResearch in September 2009. Screening Protocol: TE for [0.7, 1.4] kHz, DP for [2, 12] kHz. Values are expressed in decibels (dB)

- *Some individuals hear a same sound more than four times louder than others*. For instance, subject 14 (S14) hears a baby crying—it is in the 6 kHz area when the baby is angry and 4 kHz when it is happy (so please make them laugh!)—with an intensity of 39 dB, whereas subject 2 (S2) hears it with an intensity of 19 dB. To give you an idea, 20 dB is twice as loud as 10 dB, 30 dB four times louder than 10 dB, and 40 dB is eight times louder than 10 dB.

The otoacoustic emissions in the high frequencies [6, 12] kHz seem to define best the overall hearing sensitivity of an individual. We considered therefore that subjects having a response to a 6 kHz tone:

- >23.0 dB, were super-amplifiers (subjects S13–S16).
- 15.0 dB < response < 23.0 dB, were medium-amplifiers (subjects S1–S7).
- <15.0 dB, were non-amplifiers (subjects S8–S12).

This proposed hearing segmentation has been presented at the 30th International Congress of Audiology in Sao Paulo (Derval 2010).

2.3.1.3 Amplifier Profiles

Our inner-ear works like an amplifier. Depending on their gender, ethnicity, and age, individuals amplify sound in very different ways (Fig. 2.4). We observed for instance that Indians tend to add extra bass whereas Chinese do not like too much

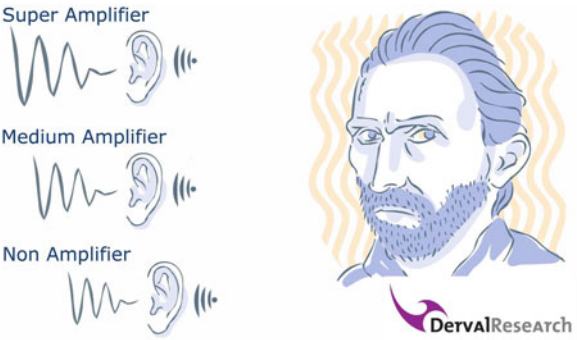

Fig. 2.4 Amplifier profiles (printed with DervalResearch permission)

'boom-boom' as they call it. As we will see in the next chapter, hormones are greatly involved in explaining such disparities.

Further measurements and observations confirmed following hearing patterns (Table 2.2):

- Super-amplifiers hear very well bass, speech, and perceive high frequencies, like a crying baby (6 kHz), a barking dog, or an airplane, four times louder than non-amplifiers, and two times louder than medium-amplifiers. This group, mainly composed of women, avoids exposure to loud sounds, and favors music and video content in the speech area (1–4 kHz), like pop music and romantic comedies. Bass is still preferred to high-pitch, and high-pitch is tolerated if distortion-free (Fig. 2.5).
- Medium-amplifiers hear very well bass and almost as well high-pitch. They hear less well speech and are therefore sensitive to bass (traffic jam, electronic devices, and background noise)—especially during a conversation. This group enjoys music and video content in the speech area, with some high-pitch accents like alternative rock and action/science fiction movies, and limited bass.
- Non-amplifiers hear speech distinctly and do not hear bass and high-pitch very well. They are therefore very resistant to loudness, and do not mind background noise. They might be sensitive to very specific distortions or sounds like nails or chalk on a blackboard—the type of frequency already used by our ancestors to send alerts. This group, mainly composed of men, enjoys loud music and video content with enhanced bass.

2.3.1.4 Sound Direction

Sounds lower than 80 Hz are difficult to localize. Women are better at locating a sound when it comes from behind and men when it comes from the front.

Men listen with only one side of their brains, while women use both sides. This is also true regarding sound direction: women activate twice as much pixels in their brain to localize a sound source (Maeder et al. 2001).

Table 2.2 Listening preferences by amplifier profiles

	Non-amplifier	Medium-amplifier	Super-amplifier
Bass	Needs to put up the volume to hear bass properly	Sensitive to bass sounds	Sensitive to bass sounds
Speech	Hears speech well	Has difficulties following a conversation with background noise	Is disturbed by surrounding noises
High-pitch	Does not hear high-pitch sounds so well except for alert signals	Hears high-pitched sounds very well	Is very sensitive to high-pitched sounds
Sensitivities	Nail on a chalkboard	All bass sounds	Baby crying, cutlery, klaxon
Favorite instruments	Guitar, saxophone	Piano, Violin	Bass, Cello
OAE at 6 kHz	Under 15 dB	Between 15 and 23 dB	Over 23 dB
Estimated population	25%, more men	50%	25%, more women

Based on the measurements and observations performed by DervalResearch on 200 consumers in France, Belgium, and the Netherlands, from May 2009 to January 2010 (Derval 2010)

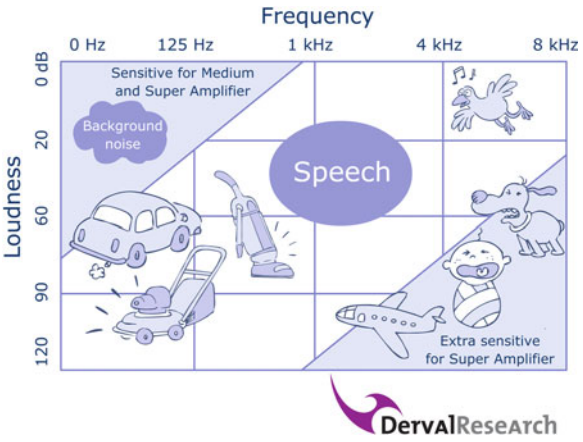

Fig. 2.5 Sensitivity to loudness (printed with DervalResearch permission)

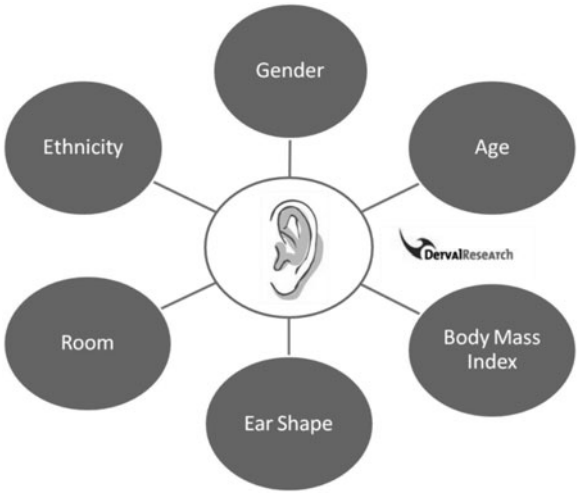

Fig. 2.6 Sound modifiers (printed with DervalResearch permission)

2.3.1.5 Sound Modifiers

Women are more likely to be amplifiers than men. Their hearing sensitivity increases during menstrual cycle and pregnancy. With age, women hear less well low frequencies. Men tend to lose first high frequencies and then might have issues following a conversation.

Factors such as the shape of our ears, our body mass index, and the size of the room we are in will also alter the perceived sound (Fig. 2.6).

Addressing the different consumers' hearing patterns can help propose the right products and services. The transport industry gives us some very good examples.

2.3.2 Dutch Railways (NS), *Music Soothes Waiting Travelers*

Following the example of London buses successfully playing classical music to make travelers feel safer, the London underground is now playing Haydn and Berlioz from dawn to midnight. Interviewed people did not all seem enthusiastic about the play-list and some would like to see the name of the songs currently playing (Fisher 2008). We will see later in this chapter that companies like *Shazam* perfectly grasped this market opportunity.

Many public places look into music as a way to improve consumers' satisfaction and increase the impression of comfort and safety. The Dutch Railways (NS) studied the impact of different types of music tempo on the perception of time spent waiting at the station (Boes and Van Hagen 2010). They segmented their travelers in two main categories according to their motivation:

- 'Must' people, traveling for work (visiting a client, going to the office, on the way back home). They are mainly men.
- 'Lust' people, traveling for leisure (visiting friends, going out). They are mainly women.

The hypothesis formulated is that 'must' people are a bit anxious and therefore looking for a relaxing music (<72 BPM (Beats Per Minute)), whereas 'lust' people might feel bored and are welcoming some more exciting music (>94 BPM).

The survey made by NS among 1,013 travelers highlights for instance that in stressful situations, like peak times, 28% of the respondents would rather not listen to music whereas 34% of them would enjoy classical music. Later in the evening, 75% of the respondents would favor easy listening music. Men showed a clear preference for relaxing music. 'Happy' music played bothered them more than women.

Adapting music to the moment of the day, the affluence, and why not, the train compartment could for sure offer nice development perspectives (Boes and Van Hagen 2010).

Did You Know? Music Should Come From Our Heart!

Subjects were asked to adjust the tempo of a song, until they felt comfortable with it. The outcome is that they preferred a rhythm closest to their own heartbeat (Iwanaga 1995).

2.3.3 *Music Preferences: Are You Pop or Classical?*

How can we explain these differences in music preferences? As the way we amplify sound explains how loud we listen to the music, I wondered if we could also explain why some people like pop and others prefer classical music. And this by analyzing the link between our favorite songs and the way we amplify each frequency.

We collected therefore the 2–3 favorite tunes of 3 Caucasian subjects in their thirties—1 medium-amplifier (man), 1 super-amplifier (woman), and 1 non-amplifier (man)—and analyzed the frequencies of their favorite (sometimes

least favorite) songs, with the spectrum analyzing software *Spectrum Analyzer Pro Live 2009*, by *Pas Products*. We were then able to compare the frequencies of their favorite music to the otoacoustic emissions of each subject (Table 2.3).

Subject 1 (S1), is a medium-amplifier, who amplifies quite well speech and high-pitched sounds but less good bass sounds. He listens to metal and to alternative rock.

His first favorite tune "Doomed Lover" by My Dying Bride, classified as metal/doom, concentrates the frequency peaks in the bass range [50, 250 Hz] where the subject amplifies the sound the least. On the other hand, in the frequencies higher than 2 kHz, where the subject hears better, the music is softer, it goes down from −20 to −40 dB (Fig. 2.7).

Another favorite tune, "Black Path" by Aereogramme, classified as alternative rock, has a spectrum very similar to the metal song analyzed earlier, with a peak around 110 Hz (Fig. 2.8).

Analyzing frequencies is more reliable than referring to music genres.

Subject 2 (S2) is a super-amplifier and amplifies very well sound in bass, even more in speech, and almost too much in high frequencies. She enjoys punk/alternative rock, but not all songs as we will see.

Table 2.3 Otoacoustic emissions in bass, speech, and high-pitch frequencies

Subject	Gender	0.7 kHz	1 kHz	2 kHz	4 kHz	6 kHz	10 kHz	12 kHz	Amplifier profile
		Bass		Speech		High-pitched			
S1	M	−1.0	8.0	26.0	19.0	16.0	23.0	−1.0	Medium-amplifier
S2	F	12.0	14.0	26.0	25.0	33.0	23.0	16.0	Super-amplifier
S3	M	6.0	−2.0	12.0	13.0	14.0	0.0	11.0	Non-amplifier

OAE measurements performed with an Interacoustics OtoRead clinical device by DervalResearch in September 2009. Screening Protocol: TE for [0.7, 1.4] kHz, DP for [2, 12] kHz. Values are expressed in decibels (dB)

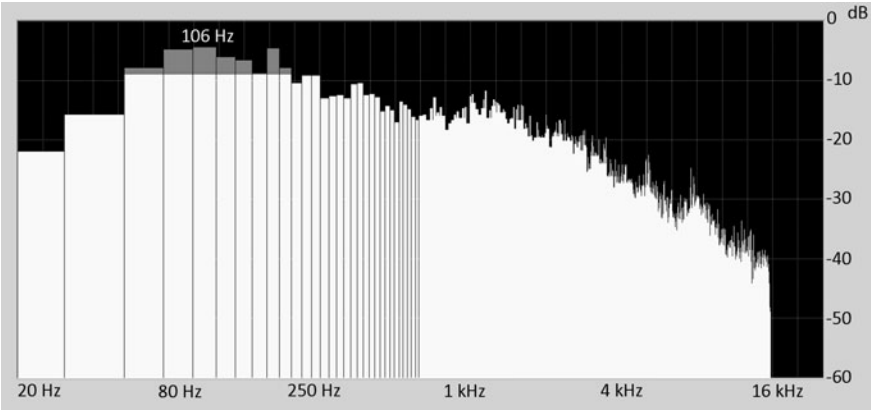

Fig. 2.7 Subject 1, spectrum analysis: "Doomed Lover" by My Dying Bride

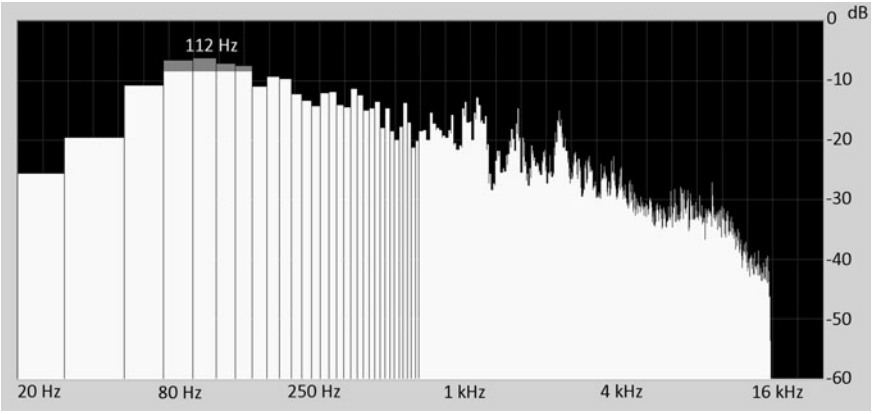

Fig. 2.8 Subject 1, spectrum analysis: "Black Path" by Aereogramme

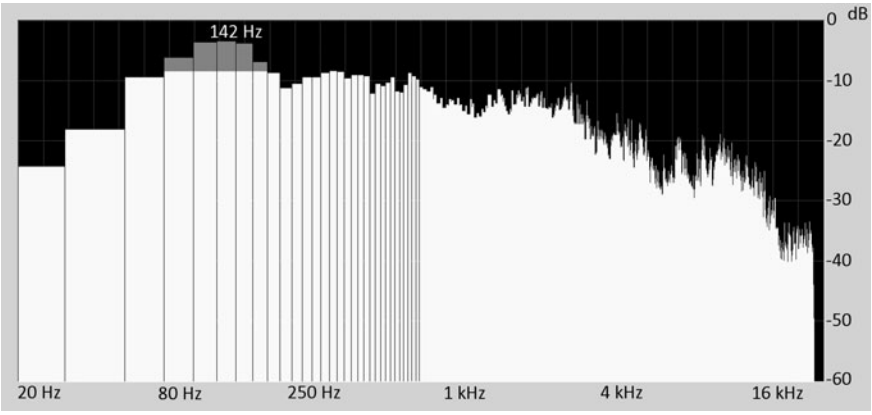

Fig. 2.9 Subject 2, spectrum analysis: "Give It Away" by the Red Hot Chili Peppers

The favorite tune, "Give It Away" from the Red Hot Chili Peppers is focusing on the bass sounds. Which is perfect for our super-amplifier (Fig. 2.9).

We were then curious to know about a song irritating her. She cited "My Immortal" from Evanescence, also alternative rock but with a very different spectrum: the peak is around 2 kHz, in the speech area, where the subject amplifies very well (Fig. 2.10).

Again, a music genre can include very different types of songs.

Our last subject (S3) is a non-amplifier and does not amplify bass and low speech so well.

The peak of his favorite tune "Better be home soon" by Crowded House, happens around 1 kHz—exactly at the frequency where there is a hole in the subject's hearing spectrum, with his lowest response to noise: −2 dB only (Fig. 2.11)!

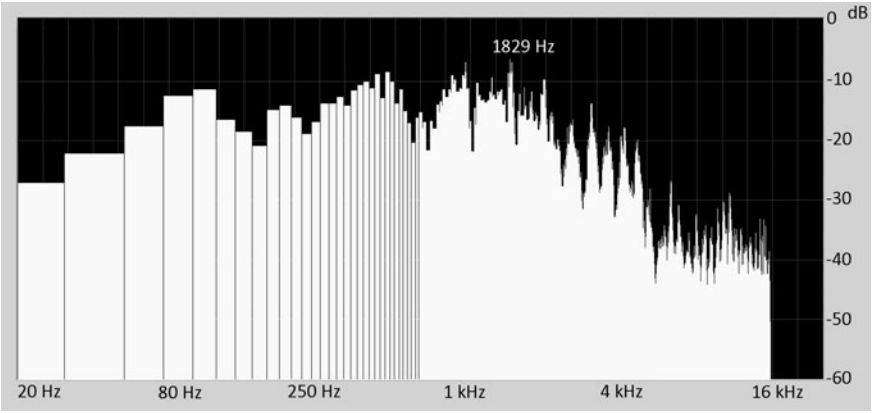

Fig. 2.10 Subject 2, spectrum analysis: "My Immortal" by Evanescence

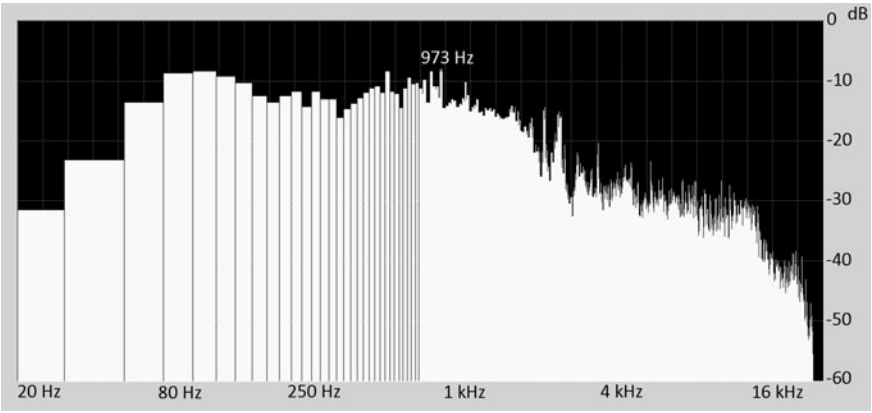

Fig. 2.11 Subject 3, spectrum analysis: "Better Be Home Soon" by Crowded House

After all, this makes sense: why would you listen to music that is attacking your ears? In the favorite as well as in the least favorite music, the rhythm, the singer, and the lyrics play a role, but in many cases it is just about wrong or right frequencies.

Did You Know? Favorite Music Therapy

About 17% of the population is bothered by Tinnitus, a permanent ringing in the ear (Jastreboff 2008). The latest treatment discovered in Germany is using people's favorite music as a healing method. Subjects play a special version of their favorite music, cleaned from the frequencies posing problem, 12 hours a day. Tinnitus seems to be caused by cortical neurons overreacting to certain frequencies, due to an accidental loud exposure. Just by giving the faulty neurons a break for one year, and only exciting their neighbours in charge of other frequencies (this process is called "lateral inhibition"), the subjects perceive a huge improvement.

2.3.4 Shazam *Music: You Name It!*

Another example of breakthrough linked to music and hearing is *Shazam*.

The one thing I really liked while listening to the radio in the car is that the audio system was able to display the title of the awesome song they just played. The Radio Data System (RDS) or Radio Broadcast Data System (RBDS) is using some spare radio frequencies to send bits of useful information. Other popular services are real-time traffic information alerts. *Shazam* provided this service on our mobile phones (iPhone, Android, Nokia, and more), enabling us to explore music on-the-go.

The principle is quite easy:

- You open *Shazam* on your phone.
- You point your device towards the song you want to identify.
- The program builds an 'audio fingerprint' of the tune, compares it with its database of over eight million tracks and displays the cover of the closest 'audio fingerprint' found.
- And this in a couple of seconds.
- Most incredible is: it actually works! I identified the last Jonas Brother's hit.

All this awesomeness is on top of that for free. For now. Apparently Shazam is introducing new on-demand advertising solutions, probably in a quest for break-even. The commission on the MP3 sales generated consecutively to the identification of the tune may not be sufficient to cover the R&D developments. Maybe they will opt for some kind of identification placement: "This song was identified for you by *Quaker*?" Recent exciting features include an integration with Last.fm and the possibility to see if the artist you just discovered is on tour soon or nearby (Evan 2010).

The firm uses its software as a smart distribution channel to reach and interact with over 15 million users, as of today. Being able to link music preferences with the mobile owner opens a realm of opportunities. Also the identification requests happen to be excellent predictors of imminent market hits and the whole industry is keeping an eye on the *Shazam* Tag Chart—just saw Adam Lambert in the top 20!

2.3.5 *Amplifier Profiles: Business Applications*

Based on our amplifier profiles, latest OAE screening methodologies, and sound identification algorithms, we can imagine following amazing new products:

1. Automatic equalizers proposing the best bass/speech/high-pitch mix based on consumers' otoacoustic emissions.
2. Filtering systems that make sure ambient music playing in hotels, stations, and lounges are suited for every type of amplifier.
3. Ringtones and alarm systems adapted to super, medium, and non-amplifiers.
4. Tunes recommendation based on otoacoustic emissions and heartbeat.
5. Acoustic diets limiting snacking by decreasing the ambient noise.

2.4 Immune System and Sensory Perception

Hypersensitivity to sound, and other stimuli, seems linked to our immune system. The study of disorders like autism and the associated sensory sensitivity tells us a lot about regular consumers' perception. Understanding which signals are associated with dangerous situations will help develop user-friendly products.

2.4.1 The Tenth Sense: the Sense of Danger

Our most instinctive sense is probably the sense of danger. That is the one supposed to alert us on risky situations.

Our *immune system* for instance acts like a bouncer and will not let in a quidam with the wrong dress code. In this *innate defense system,* the filtering decision occurs instantly, the criteria being "does he/she fit the club or not?". We also have a second security barrier inside, the *adaptive defense system*, that recalls past events and says, after a while "wait a minute, you were the one leaving without paying last week: out!".

When we think of invaders, bacteria and viruses come to our mind. In some circumstances, relatively harmless visitors like toasted bread and roasted coffee can endanger our immune system. The chemical *Maillard reaction*, that occurs when you heat foods containing sugars, and the advanced glycation endproducts (AGE) they produce are responsible for chronic inflammatory diseases such as Crohn's disease and colitis, diabetes, and delayed type hypersensitivity (DTH). This happens in cases of deficiency of RAGE, the receptor for these advanced glycation endproducts. This receptor is, according to recent observations critical for maintaining the immune tolerance of organs challenged by external stimuli. Not only RAGE senses danger but it seems to directly modulate our behavior, too (Nawroth 2007).

This link between the immune system and sensory perception could explain why some individuals are hypersensitive, and overloaded by external stimuli.

Did You Know? When Plants Are Freaking Out!

Tobacco plants too have feelings. When sagebrush plants got eaten up by hungry beetles, researchers observed that all the nearby tobacco plants started to produce in their leaves a toxic chemical to protect themselves against the invaders (Karban et al. 2004). This poison is called nicotine.

2.4.2 Why Would Spock Hate Yellow?

An intriguing case of sensory overload is observed in people suffering from Asperger syndrome. This form of autism, situated on the light side of the Autism Spectrum Conditions (ASC), is now detected, for instance in the UK, in one child out of 100.

The character Spock from Star Trek is often depicted as an Asperger: "*I quickly learned that my husband and Spock had a lot in common. My husband could have been the one stating the phrase that's "highly illogical" because emotion didn't play a role in any decision he made. He also became incensed when people made the same mistakes over and over. He felt that people should learn from their mistakes and retain the information for life (just like Spock's brain). Honestly, how many people do you know who still remember their locker combinations from elementary school*?" (Pratinfield 2010)

Aspies, as they are called, are over-sensitive to sound. In most cases, they suffer from hyperacusis: a noise of 65 dB—which corresponds to a loud conversation—will already hurt them, when average people can stand up to 130 dB without any issue. They suffer from anxiety, and are also sensitive to taste and smell. In his last Bollywood movie, Shahrukh Khan plays an Aspie. An incredible scene is when horrified by the yellow jacket his love, played by Kajol, wears, he just runs away (Johar 2010). Indeed, people suffering from Asperger are so sensitive that the yellow color is much too bright for their eyes.

In her book, Jen Birch, diagnosed at 43, tells her story and how she was reluctant as a child to eat vegetables, how bad her sense of balance was when she was trying to learn riding a bike, how she could not make an emotional difference between horror movies and reality (even if she was told it was fiction), and even how clothing was hurting her. For a long time, people thought autistic children did not like contact and hugs for 'psychological' reasons (here we go again!). It appears, however, that in fact they are just over-sensitive to touch (Birch 2003). The disorder was thought to be less common among girls but it looks like they were just under-diagnosed because their symptoms differ from boys: they speak more, are shy or sometimes rebel, and obsessed by more common topics, so that they can get unnoticed.

Did You Know? Einstein socks

Asperger sufferers are very sensitive to textures and struggle very often to find seamless socks, that feel nice on the toes. Maybe a new market for Blacksocks.com we will study in Chap. 4? As Einstein could not speak fluently at age 9 and attended, years later, his induction ceremony to become an American citizen sockless, it is likely that he was suffering from a form of autism (Fattig 2007).

2.4.3 What is the Difference Between a Nerd?

You may now wonder: "*If Spock is my favorite character in Star Trek, do I fall into some of the Autism Spectrum Conditions* (*ASC*)?" If chitchat bothers you, if you find it difficult to make new friends or to keep a conversation going, if you know everything about a topic, the answer might well be yes. Believe it or not but while writing this section I checked my level of autism with the test developed by Cambridge's Autism Research Centre and scored 33. A score higher than 32 is a

good indicator of some form of ASC, and the average for 'normal' people is 16.4. First, I had a couple of drinks, and then I thought that bordering the Autism spectrum was not that big of an issue after all, as long as people know about it. That's why I decided to do my coming out: we all have a little nerd inside:)

If you have a doubt now, you can take the test and check your friends and family at www.betterimmunesystem.org.

Did You Know? Californian Dream and Autism

In the US, the autism rate is increasing in California, to such an extent—it went up from 5 to 12 cases per 1,000—that the federal government ordered research to find out the causes. The conclusion was: "*Without evidence for an artificial increase in autism cases, we conclude that some, if not all, of the observed increase represents a true increase in cases of autism in California, and the number of cases presenting to the Regional Center system is not an overestimation of the number of children with autism in California.*" (The M.I.N.D. Institute 2002). Wait a minute, where is the Silicon Valley again?

By studying supersensitive individuals, we get a better understanding of some common human perception traits, that can be used as guidelines when designing new products and services.

2.4.4 Sensory Alert Codes and Product Design

Sensors are our alarm system. And even if we all have a different perception of taste and of sound—we see later that it is also true for smell, touch, and vision—some stimuli are perceived universally. They are synonymous with danger.

2.4.4.1 Taste and Danger

The bitter taste of vegetables is due to toxins—the plants must secrete them hoping it will prevent them from being eaten (like with the tobacco plants seen earlier). And it works! Our taste receptors are able to detect the presence of these glucosinolates in natural food. In fact, all the bitter vegetables do not contain this poison: endive and spinach seem safe, but beware of watercress or radish. Experiments with PTC strips showed that tasters perceived vegetables containing glucosinolates 60% more bitter than non-tasters but that both groups perceived safer bitter vegetables in the same way. The research mentions that it is critical for people having thyroid insufficiency to avoid those 'bad bitter' vegetables (Sandell and Breslin 2006). You remember our autistic friends reluctant to eat vegetables? They should listen to their wise taste buds because autism is actually due to hypothyroidism (Gillberg et al. 1992)! The elegance of nature.

So when developing pharmaceutical or food products, making sure the level of bitterness is acceptable for the target consumers is an important step.

Table 2.4 Top 20 disgusting sounds (Cox 2008)

Rank	Disgusting sound	Rank	Disgusting sound
1	Vomiting	11	Tasmanian devil
2	Microphone feedback	12	Cough
3	Multiple babies	13	Cat spitting
4	Train brakes	14	Mobile phone rings
5	Seesaw	15	Creaky door
6	Violin	16	Barking mad dog
7	Whoopee cushion	17	Sniff
8	Baby cry	18	Fingernails on chalkboard
9	Soap opera argument	19	Polystyrene
10	Mains hum	20	Dentist's drill

2.4.4.2 Sound and Danger

It was believed that the sound of a nail on the chalkboard was the most annoying sound ever. Over 400,000 people from Australia, Africa, Middle East, North America, Europe, and South America listened to 34 sounds via the Internet and ranked them from the most to the least horrible. Here are 17 noises considered even more atrocious than a nail on the chalkboard, in this top 20 disgusting sounds, featuring seesaws, violin, train brakes, multiple babies, and vomiting (Table 2.4).

In fact, irritating sounds vary depending on the amplifier profile of the consumer of course. People amplifying more 4 kHz sounds suffer with chainsaw, cutlery noises, and coughing (coughing is much louder than we would expect!), at 6 kHz you will be more sensitive to baby cry, and around 500 Hz to electronic devices. The 'multiple babies' report is symptomatic of a non-amplifier: he/she starts getting annoyed only when a regiment of babies is screaming. Not listed are the car horns and other alarms, especially in the morning!

Did You Know? Alarm for Senior People

A promising market is the one of alarms for senior people. Most of the alarms are high-pitched, but that is exactly the part of the hearing spectrum many seniors lose first. A patent has been registered for an alarm you can adjust to the frequency that works best for you.

2.4.4.3 Vision and Danger

Concerning colors and shapes, the advertising industry is probably the best example of what not to follow. They use all the codes of danger to attract consumers' attention: red, yellow, and movements. And it works in the way you notice the message—you have no choice, it is jumping at your face. The question is: How receptive are people when they are attacked by a brand? Luckily firms can use other approaches to get noticed, like communicating at the right moment with *Wait Marketing*. And interacting with customers while they are bored waiting (Derval 2009). So unless you run emergency services, avoid those long wavelength colors as they arrive directly on the focal point of the eye, as we will see in Chap. 5.

In terms of shapes, we are more naturally attracted to human faces. Putting pictures of people on your website and products can help to create a connection with the consumer without being aggressive.

2.4.4.4 Smell and Danger

Incense smoke and other scents including airborne contaminants, can provoke a violent reaction called "odor-induced panic attack" (Greene and Kipen 2002). So if you plan to put incense sticks in your shop or decorate your restaurant with thousands of nice candles, check first if your target consumers are sensitive to chemicals!

2.4.4.5 Touch and Danger

A light touch is an alert code. It allows you to detect a mosquito landing on your arm, or a pickpocket visiting your purse. A sudden change in temperature constitutes a warning, too.

I assume that you do not plan to send painful stimuli to your clients, right? So the key point to remember is that: strong foods like menthol or chili, loud sounds in sensitive frequencies, bright lights, chemical perfumes, and sudden tactile signals can hurt.

Now that we have all the tools to develop user-friendly products, let us see how to develop very popular ones and follow the example of the *Nintendo Wii*.

2.5 Spotting Business Opportunities

Understanding target consumers' perceptions and codes is key for developing good products. We show with the *Nintendo* case that having a look at non-consumers can unlock huge market opportunities. We also show that evaluating the potential market based on 'must have' customers and analyzing the substitution products they currently use is the road to successful opportunity and feasibility studies.

2.5.1 Consumers versus Non-Consumers

As seen previously with the Red Bull case (Wipperfurth 2005), creating a new profitable market is the best business opportunity you can dream of. Millions of customers waiting for you, no competition: a *blue ocean* of opportunities (Kim and Mauborgne 2001). Why would you indeed fight on prices and features with other firms when you can just set up the rules and standards of a new product category?

The only thing you have to do is to find this disruptive innovation. Because it works. Even in overcrowded markets like video games. *Nintendo* just proudly

announced that *Nintendo Wii* is now the best-selling hardware in the history of video games with over 67 million devices sold since the launch in 2006. *Nintendo DS* sold over 125 million consoles (Nintendo Co. Ltd 2010). With hits like Super Mario Bros, Wii Sports Resort, Just Dance, and Wii Fit Plus, the company is the uncontested leader in the video game market and has created a new market, making the most of technological sensors and human senses.

But what about Xbox and PlayStation? Let us turn back the clock and see what happened. The battle between Nintendo, Microsoft, and Sony, was so far won by Sony and its fast processing and high definition PlayStation (Farhoomand 2009). Video gamers were mainly men mastering racing, fighting, or arcade games and expert in maneuvering vibrating joysticks. The only way to convert the hardcore gamers was increased performance. Until that special day, when someone at Nintendo decided to look at the market differently and saw huge opportunities. For sure, he must have used a *positioning map*!

Positioning map is a powerful tool used by leading companies but not very well documented in the literature. Here is the one I designed on the video game market a couple of months before the launch of the Wii Fit. As you will realize soon, everything is predictable, with the right data and hypothesis.

The *positioning map* will help you understand your personas, as well as who your direct and indirect competitors are, and you will see the potential and opportunities for your product on the market. It replaces the traditional company SWOT analysis that lists the general strengths, weaknesses, opportunities, and threats, as it is more effective to assess a company's competitive advantage for each and every persona (Fig. 2.12).

Here is how you can build your positioning map in three steps:

2.5.1.1 Step 1: Identify the Groups of Customers that Are Relevant to Your Business

- *Personas*: In the pre-Wii era, gamers were mainly bachelors and nerds (as a reminder, I myself fall in this category, so no offense). Let us take them as our rough personas for now. So bachelors spend most of the time having drinks with friends, playing pool, doing fitness, going to the cinema, and playing Xbox. Nerds are more at home alternating between Home Cinema and PlayStation, more technical than the Xbox.
- *Competitors*: Direct competitors would be Xbox and PlayStation. Indirect competitors would be pubs, pool, cinema, and fitness.

2.5.1.2 Step 2: Find the Relevant Axes

- *Differentiating criteria*: Best is to start with the existing customers: what is the most important for them? In the example of Nintendo Wii, the haptic

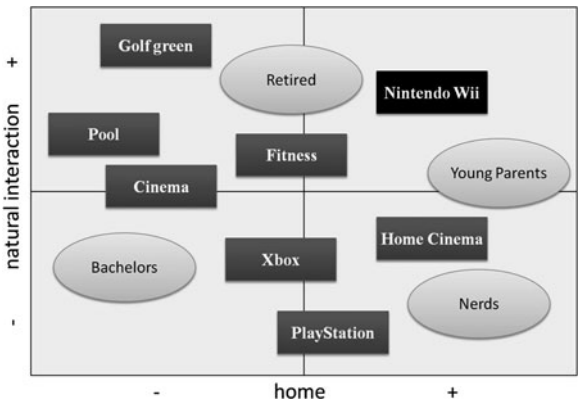

Fig. 2.12 Nintendo Wii positioning map (printed with DervalResearch permission)

interface—understand by that the natural movements you use to give instructions to the machine—and the fact you can enjoy entertainment at home are specific to the Wii. At the same time these criteria help differentiate the nerds—more at home and keen on a technical user interface (UI)—from bachelors more outside and not against a more user-friendly UI. We assumed here that bachelors and nerds were two distinct groups, they are both single but only one is in the market! These are the two axes of your map. Note that price is never a valid criteria as it does not help segment your customers: the ones who cannot pay, are simply not in the target.

- *Relative position*: We can now place the personas on the map according to their sensitivity to each criteria. For instance, bachelors like going out more than nerds and are therefore more on the left side of the map. We can also position the substitution products—the direct and indirect competitors close to the concerned consumer: For nerds, the direct competitor can be PlayStation, and the indirect competitor a Home Cinema Theatre.

2.5.1.3 Step 3: Reveal Market Opportunities

The idea is then to find other market opportunities by using retroduction, our Sherlock Holmes reasoning.

What about using the substitution product to find other personas and then go back to the product to see which disruptive innovation would suit them best?

So let us start with cinema: who else can we find there? Senior people, probably. Indeed, as young parents are at home busy with baby powder. Talking about young parents, they are watching Home Cinema Theatre too, like nerds. If we add retired and young parents on the map, we will suddenly have a vision: Wii Fit!!

Let us have a drink, we are done.

The positioning map helps you to identify blue oceans, adapt products to new target customers, and design disruptive innovations.

Note that the perceptual map you may encounter is another concept: you ask consumers to tell how they perceive your brand and then you just put their feedback on a map.

2.5.2 Must Have versus Nice to Have

Having a vision, based on observation and reasoning (if I hear the word "intuition" once again, I leave this book!) is a good start, but we now need to make sure that the new market is profitable. To validate the expected revenues, I propose to validate the needs. The idea is that if a consumer thinks a product is a 'must have', he or she will buy it. It is as easy as that. On the other hand, if it is a 'nice to have' then there might be a gap between the purchasing intentions and the actual revenues—a gap called "market flop".

Let us take the retired and young parents consumer groups. For which group is the product a 'must have'?

- Young parents just discovered the magic world of baby powder and 6 kHz sounds. They are a bit stuck at home. They could, of course, invite friends to come over for a movie night but they lost them all the year after birth during which they did not give any signs of life to anybody, the last stimulus received being an atrocious home-made baby announcement card. A Wii would be an alternative to 'couch potatoing' and might even help them make new friends!
- Retired people enjoy their family from a distance and try to travel or occupy their garden as much as possible. Having a Wii would be nice but maybe more for their children and grand-children.

Which segment would you focus on?

We could go for the young parents. As it seems that the retired people are a bit more outside. Also they have more difficulty with reading, less memory (will they remember where they put the Wii control?) Wait a minute, what about designing a special *Nintendo DS* for them that we could call *Brain Age*? Or why not go a step further and include other sensors in the Wii in order to help senior citizen monitor their health? Here you go, it's raining market opportunities.

Did You Know? DS for Seniors

While I was editing this book, Nintendo announced a new DS model for seniors with Brain Age pre-installed, a bigger screen, and a stylus that resembles more closely a regular pen. You can truly spot opportunities with this positioning map! (Nintendo 2010)

2.5.3 Substitution Products and Market Attractiveness

Back to our young parents. We started with this rough consumer segment, but it is now time to analyze deeper the related personas. This will enable us to evaluate substitution products and market attractiveness.

Let us assume our first Persona Chris, who we studied in Chap. 1, lives with Marcia, a young researcher, and they just had their second child. Marcia is testosterone-driven, we will come back to this in next chapter, and very much into LEGO®, innovations, and just bought a colorful Acer netbook. She visits pop and rock concerts, but always wears ear-plugs as she is a super-amplifier. They both like to have fun but do not want to spend time reading a 100-page user guide before using a system. They heard of the Wii and were intrigued by the natural interaction and also the white design, very different from the Xbox and PlayStation format. The good news is that they are not already equipped with a competitors' solution. What about indirect competitors? They were thinking of buying a new design sofa. On the other hand, with the small children, it might not be the right moment.

Chris and Marcia are clearly trendsetters. They are interested by games, but also fitness and why not some yoga. If other consumer groups are also in the target, let's also go for the Wii Fit. We can now evaluate how many Chris and Marcia households are in the market and plan to convert at least 80% of them, admitting that 20% might have decided to buy the sofa in spite of our warning (Fig. 2.13).

2.5.4 Opportunity or Feasibility Study?

An opportunity study will be needed to validate the previous hypotheses.

We could be tempted to evaluate our Wii opportunity for new young parents in this way:

- There are 10 million young parents households.
- We are realistic and think we will convert 5% of them.
- So our expected sales are 500,000 units.

What is wrong here? The flaws are that, if we assume our product is a 'must have' for young parents, then we should convert them all (or 80% of them because of the sofa). If only some of them are interested, then we have to identify this 5% subgroup.

For international products, it is critical to quantify how many households like Chris and Marcia are present per country.

Contrary to the accepted wisdom, the opportunity study must be detailed enough to not miss a critical aspect of the project. Imagine Nintendo making a whole study on the opportunity to launch the *Wii Vitality Sensor*—that will keep track of a user's heart rate—including the patent for the system, the design, and they discover at feasibility stage only that they need the recommendation of doctors and therapists to convert their personas, with all the associated costs of clinical testing.

The viability of a project is linked to its conformity to the company's strategy and to:

- *The expected revenues*: for which personas is the product a "must have", how many are they, what are they willing to pay? What could they spend their money on, instead?
- *The costs*: what are the main fixed and variable costs?

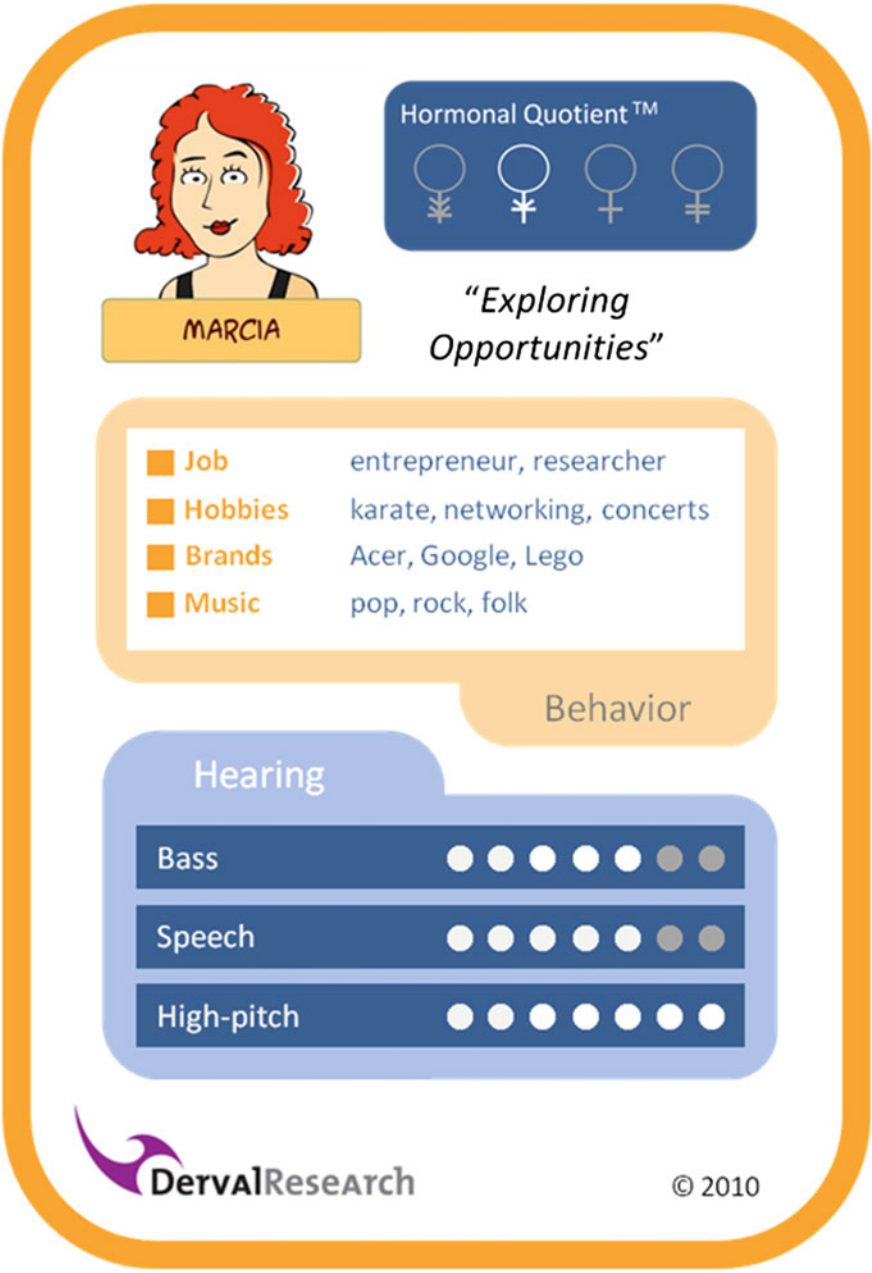

Fig. 2.13 Hormonal Quotient™ (HQ) of Marcia (printed with DervalResearch permission)

The feasibility study consists in describing in detail how to manufacture the peripheral and approach health professionals.

If you take all these steps, you will for sure spot great business opportunities!

In this chapter we saw how to detect and even create profitable markets. In Chap. 3, we will see how we can accurately predict the market response.

2.6 Take-Aways

Attractive markets

- Some countries or markets have more of your ideal customers.
- Households are complex purchasing centers.
- A product can be disliked by many people as long as it is loved by its target consumers.

Sound

- Some people hear a crying baby four times louder than others.
- Favorite music has the right tempo and frequency.
- Super, medium, and non-amplifiers amplify bass, speech, and high-pitch in different ways.

Immune system

- Hypersensitivity is linked to our immune system.
- Products like toasted bread or roasted coffee can become toxic.
- To make user-friendly products, let us avoid stimuli perceived as a danger.

Business opportunities

- Observing non-consumers can unlock huge business opportunities.
- Understanding substitution products is a good way to find new clients.
- Designing a positioning map will help you spot these blue oceans.

References

Anderson T (2007) When vinyl is better than CD. Available from Tim Anderson's ITWriting: http://www.itwriting.com/blog/106-when-vinyl-is-better-than-cd.html. Accessed 23 February 2010

Birch J (2003) Congratulation! it's Asperger syndrome. Jessica Kingsley Publisher, London

Boes E, Van Hagen M (2010) Stations? Daar zit muziek in! In: European transport conference 2010, Glasgow

Cousino Klein L, Faraday M, Quigley K, Grunberg N (2004) Gender differences in biobehavioral aftereffects of stress on eating, frustration, and cardiovascular responses. J Appl Soc Psychol 34(3):538–562

Cox T (2008) Scraping sounds and disgusting noises. Appl Acoust 69(12):1195–1204

Derval D (2009) Wait Marketing: is it the right moment? DervalResearch, Amsterdam

Derval D (2010) Hormonal Fingerprint and sound perception: a segmentation model to understand and predict individuals' hearing patterns based on otoacoustic emissions, sensitivity to loudness, and prenatal exposure to hormones. In: 30th International Congress of Audiology-ICA 2010. The International Society of Audiology, Sao Paulo

Dvorak (2009) Creative ZEN X-Fi2 preview: has creative lost its fricken mind?! Available from Dvorak Uncensored: http://www.dvorak.org/blog/2009/09/22/creative-zen-x-fi2-preview-has-creative-lost-its-fricken-mind/. Accessed 23 February 2010

Evan J (2010). Shazam for iPhone gets Last.fm, ticketing and more… Available from 9to5mac: http://www.9to5mac.com/bam_bam_shazam_34889. Accessed 23 February 2010

Farhoomand A (2009) Nintendo's disruptive strategy: implications for the video game industry. The University of HongKong, HongKong

Fisher N (2008) Classical music is a big hit on the London underground. Available from Times Online: http://entertainment.timesonline.co.uk/tol/arts_and_entertainment/music/article3284419.ece. Accessed 24 February 2010

Gillberg I, Gillberg C, Kopp S (1992) Hypothyroidism and autism spectrum disorders. J Child Psychol Psychiatry Allied Discipl 33(3):531–542

Greene G, Kipen H (2002) The vomeronasal organ and chemistry sensitivity: a hypothesis. Environ Health Perspect 110(4):655–661

ICBA (2004) Using otoacoustic emissions as a biometric. In: First international conference on biometric authentication. Springer, Berlin, pp 1–34

Iwanaga M (1995) Relationship between heart rate and preference for tempo of music. Percept Motor Skills 81:435–440

Jastreboff P (2008) Tinnitus & Hyperacusis Center. Available from Emory University Atlanta: http://www.tinnitus-pjj.com/. Accessed 24 February 2010

Jayant N, Johnston J, Safranek R (1993) Signal compression based on models of human perception. IEEE, pp 1385–1422

Johar K (Director) (2010) My name is Khan [Motion Picture]

Karban R, Huntzinger M, McCall A (2004) The specificity of eavesdropping on sagebrush by other plants. Ecology 1846–1852

Kim W, Mauborgne R (2001) Creating new market space. In: Harvard Business Review on innovation. Harvard Business School Press, Boston, pp 1–30

Maeder P, Meuli R, Adriani M, Bellmann A, Fornari E, Thiran JP, Pittet A, Clarke S (2001) Distinct pathways involved in sound recognition and localization: a human fMRI study. Neuroimage 14(4):802–816

Marieb EN (2007) Regulation and integration of the body. In: Marieb EN (ed) Human anatomy and physiology, 7th edn. Pearson Education, San Francisco, pp 387–640

Nawroth P (2007) RAGE, a receptor sensing for danger. In: Ninth international symposium on the Maillard reaction. International Maillard Reaction Society, Munich, p. 38

Nintendo (2010) Nintendo reveals hardware and software lineup for the first half of 2010. Available from Nintendo: http://www.nintendo.com/whatsnew/detail/xfWC6drtSlzaYXjDmtuf7MeuI2Uf94vb. Accessed 14 March 2010

Nintendo Co. Ltd (2010) Financial results debriefing. Nintendo, Tokyo. http://www.nintendo.com/whatsnew/detail/xfWC6drtSlzaYXjDmtuf7MeuI2Uf94vb

Pratinfield M (2010) My husband and son have Asperger's symptoms. Available from all about Aspergers symptoms: http://allaboutaspergerssymptoms.com/my-husband-has-aspergers-symptoms. Accessed 24 February 2010

Sandell M, Breslin P (2006) Variability in a taste-receptor gene determines whether we taste toxins in food. Curr Biol 16(48):792

Wipperfurth A (2005) Brand hijack: marketing without marketing. Portfolio Hardcover, San Francisco

http://www.springer.com/978-3-642-12092-3

The Right Sensory Mix
Targeting Consumer Product Development Scientifically
Derval, D.
2010, XIV, 146 p., Hardcover
ISBN: 978-3-642-12092-3