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A method to measure the emotional experience of audience by the EMOJ tool. The case study of Macerata Opera Festival

Metoda pomiaru doświadczenia emocjonalnego odbiorców za pomocą narzędzia EMOJ. Studium przypadku Macerata Opera Festival

This paper aims to present a case study on the application of Emotional Analytics to measure audience experience in the culture sector. The adopted technology enables audience measurement by detecting persons' face and recognizing the emotions they feel in real time, while watching a show or attending a cultural event. It is the result of a long-term research and development project, whose goal is to advance neuro-marketing by proving a non-invasive ad wearable technology to investigate individual affective and emotional response in public spaces. The developed Emotional Analytics platform is called EMOJ and in summer 2019 has been used to analyse the experience lived by the audience of the Macerata Opera Festival, a series of opera representations that take place in the Sferisterio Arena, in Macerata. The goal of this project is to provide useful information on the quality of each performance and of the entire festival perceived by the audience, in order to make the right choices to improve the performances and to have a return on ticket sales for the coming years.

Keywords

customer experience, artificial intelligence, emotions detection, marketing for cultural organizations, experiential marketing

Artykuł przedstawia studium przypadku dotyczące zastosowania analizy emocjonalnej do pomiaru doświadczenia odbiorców w sektorze kultury. Przyjęta technologia umożliwia pomiar widowni poprzez wykrywanie twarzy osób i rozpoznawanie emocji, które odczuwają w czasie rzeczywistym podczas oglądania programu lub uczestnictwa w wydarzeniu kulturalnym. Jest to wynik długoterminowego projektu badawczo-rozwojowego, którego celem jest rozwój neuromarketingu poprzez doskonalenie tzw. ad wearable technology stosowanej w celu badania indywidualnej reakcji afektywnej i emocjonalnej w przestrzeni publicznej. Opracowana platforma analizy emocjonalnej o nazwie EMOJ latem 2019 r. została wykorzystana do analizy doświadczeń widzów Macerata Opera Festival — serii przedstawień operowych, które odbywają się na Sferisterio Arena w Macerata. Celem tego projektu jest dostarczenie użytecznych informacji na temat jakości każdego spektaklu i całego festiwalu postrzeganego przez widownię, aby udoskonalić widowisko i wskutek tego poprawić wyniki ze sprzedaży biletów w nadchodzących latach.

Słowa kluczowe

doświadczenie klienta, sztuczna inteligencja, wykrywanie emocji, marketing dla organizacji kulturalnych, marketing empiryczny

JEL: D870, Z110



Introduction: The growing importance of Customer Experience Management

Marketing is constantly in evolution and today it includes many aspects that just few years ago were unthinkable. The technological progress, the innovative applications of technologies and the increasing integration between online and offline are changing the marketing mind-set, and this is the main reason of the growing importance of CX (customer experience) in marketing strategies. "Customers in the modern marketing world do not want to be told, they want to participate and experience the benefit themselves. Customer empowerment has a real, measurable advantage for organization. When people have a chance to try products, play with new technologies or see a company's environmental principles made clear, they develop a more personal connection with a brand. They become partners in the experience and more an investor in the brand's success" (Seligman, 2012).

Thanks to the web, customers are more informed and aware than ever. They interact with each other and talk about brands (to comment and criticize), with great bargaining power towards companies. Consequently, CX is becoming one of the most important part of a business strategy, because positive experiences are the key for building strong, durable and profitable relationships with customers.

"Offering high-quality products and services is not enough to survive in today's economy. Companies have to compete in a more complex level by creating a satisfactory customer experience through all stages of the buying process, managing the customer's expectations and assessment before, during and after the purchase" (Klaus, 2014).

CX concerns every moment of contact between a business and its customers, in all the touchpoints (physical and digital) and in every step of the customer's journey. "It can be seen as a summary of interactions, mental images and feelings that the customers on the inner accept on the business's engagements" (Seligman, 2018).

Thanks to a good CX, brands have the possibility to be remembered and spread by satisfied customers, who can become brand ambassadors. By promoting the product and the company by word of mouth (both online and offline), they will be the most effective marketing weapon, because the message comes from a trusted source (a friend or a relative).

Moreover, the experience made with a company is never the same for two people, because of the limitless differences between the human beings. That is why it is crucial for a business to study and understand its customers, with tools like the buyer personas analysis made from market researches and surveys. These tools are useful for defining the

different approaches to adopt with every kind of customer, in order to establish a positive connection that involves products, services, assistance and all the marketing and communication activities (Revello, 2015).

In fact, the real power of a good CX strategy is achievable with a good Customer Relationship Management system, because it allows combining the experience of a single customer with all the data we have on him/her, in order to be able to provide custom products, services, assistance and contents. "In addition, CEM goes far beyond CRM by moving from recording transactions to building rich relations with customers" (Schmitt, 2010).

Customer Experience Management and Customer Relationship Management are different but complementary, because the first is useful for marketers to build a strong, personalized and memorable customer experience, through the data collection from behaviours and interactions across the various touchpoints. CRM instead is useful for sales staff, because it can create a custom service in favour of a high value sale, and its goal is to have loyal customers that repeat the purchase.

"The increasingly settled view of researchers is that customer experience is generated through a longer process of company — customer interaction across multiple channels, and is generated through both functional and emotional clues." (Klauss, 2013).

Emotional connection is crucial for the creation of durable and profitable relationships with customers. The emotional insight can inform management, designers, marketers, salespeople and others at a more comprehensive and pertinent level. Such insight in tandem with transactional history would provide the knowledge required to build a more powerful connection between a company's brand and its customers (Hill, 2008).

CEM should be the basis of every omnichannel marketing strategy. "Omni-channel marketing refers to the synergetic management of the available channels and customer touchpoints to enhance the customer experience and improve performance. It has become a cornerstone of marketing strategy, but putting it into practice is still one of the major challenges that firms face today" (Melero, Sese, Verhoef, 2016).

The integration of physical and digital channels that a company uses to dialogue with its customers is the only way to manage and optimize their experience. The synergic management of the various channels can guarantee to consumers a coherent and gratifying experience in each of them, with no differences of approach and effectiveness due to the channel chosen by that customer in that moment.

Omni channel plays an increasingly important role in company's strategic choices. For this reason, it becomes crucial to invest time and resources on specific CEM activities, always keeping in mind

that the starting point is data management, and the point of arrival is the personalization of the contents conveyed and offers proposed, starting from these data (Giraldi, 2016). Acquiring a deep knowledge of customers comes from extracting information on them, in every touchpoint used by the company. It means in one hand to exploit the big amount of customers data, collected from online and offline channels, and to extract from them valuable information with speed and precision. On the other hand, companies must activate qualitative researches to go deeper into the single customer behaviours, with custom surveys based on his/her activities and on all the data we can collect about that specific customer.

The Customer Experience Management (CEM or CXM) refers to a specific and long-term project that consists in the implementation of a series of processes that companies should adopt if they want to track, supervise and govern the interaction with customers, in order to improve their experience to the point of consolidating their loyalty.

In other words, CX should be the starting point of all the business strategies, because it affects many other activities, including production, logistic organization and all the marketing activities.

CEM can give all members of the organization a complete view of the customer, and the advantages include better customer service, better customer retention, higher conversion rates and an improvement in the overall customer lifetime value. Strengthening brand loyalty leads to more revenue, because brand supporters spend more, more frequently, buy more products and services and let the brand reach more people.

CEM is also useful to identify customers who are about to move away from the brand, helping the marketing and sales team in choosing the right offer, promotions or any other incentive to keep them loyal. "Satisfy the customer has new meanings in a society in which technology is enabling companies to give attention to customers at an unprecedented level" (Davenport, 2001).

Emotions detection with EMOJ's technology

CX is strongly related to the emotions felt by a person when he/she comes in touch with a brand. "To fully leverage experience as part of a customer-value proposition, organizations must manage the emotional component of experiences with the same rigor they bring to the management of product and service functionality" (Berry et al., 2002).

Different studies in marketing, communication and psychology tell us that the emotional part of

our brain often overcomes the rational one, especially in the purchase choices of many kinds of goods, for example the famous impulse purchases (Shapiro, 2014). Often people buy something for emotive reasons and then find rational motivations to justify the purchase.

"Delivering great CX also relies on understanding that customers' decisions are influenced by emotion as well as logic. To gain customers' confidence, it's essential to take their perspective seriously and seek out ways of stimulating positive emotional responses and preempting negative ones." (Villani, 2019).

A CX strategy is based on the emotions that a brand can arouse in people that get in touch with it. Emotions are the most powerful trigger to make a person do all the steps of the customer journey we planned, from unknown to customer until loyal customer, that repeats the purchase and talk positively about our brand and products.

The growing relevance of emotions in marketing strategies is giving a boost to the market niche of emotion detection, recognition and measurement. Nowadays, there are different methods and technologies to recognize human emotions, with different levels of intrusiveness. Obviously, the use of invasive instruments (e.g., ECG or EEG, biometric sensors) can affect the subjects' behaviour, especially the spontaneity and consequently the emotions felt during the measurement. The majority of such techniques, methods and tools refer to three research areas: facial emotion analysis, speech recognition and biofeedback emotion analysis. All techniques elaborate the data captured by a network of sensors, either embedded in wearable systems or distributed in space, and collected by data management systems (Mengoni et al., 2017).

The most well-known limits in the application of such technologies in public spaces are intrusiveness (due to the necessity of wearable devices) and complexity of sensors' network. To overcome these limitations, in 2015 a team of researchers of the Polytechnic University of Marche started to investigate the possibility to combine computer vision, Internet of Things and Artificial Intelligence to develop an innovative emotional analytics system that simply processes the images captured by commercial multimedia sensors.

In 2017, EMOJ was born as the spin-off the above-mentioned University, to transform the world of Customer Experience by its innovative multi-platform system, that detects faces, gaze, facial expressions and recognizes age, gender, areas of attention and emotions in real time. The software analyses the images captured by 4k cameras and webcams by combining computer vision and deep learning techniques. EMOJ builds

a bi-dimension emotional model and creates proper image training sets suitable for analytics purposes. Raw data, resulting from the application of emotional analytics engine can be then elaborated to calculate a set of key performance indicators that vary according to the field of application; for instance, in case of audience monitoring indicators are monitored people engagement, degree of valence and excitement, level of attention, etc. EMOJ technology is able to detect up to fifteen people with a single camera, and it can detect even more people at once combining many cameras. The only limit for monitoring many people simultaneously is the power of the computer that run the system, while a normal pc or smartphone is able to run the single person detection version. The software is not heavy, despite the inner CPU processes all the data and no information goes to the external server.

The identification of emotions is based on the work of psychologist Paul Ekman, who in the 1970s studied the human expressions of feelings and defined six fundamental emotions: happiness, sadness, disgust, fear, surprise and anger (Ekman, 1975).

A person's emotional state at a specific time is the result of the blend of these universal basic emotions. EMOJ has developed its algorithm starting from Ekman's emotions definition because it is valid for every type of person, from different cultures and different ethnic groups.

Once the emotional model had been defined, the work focused on the training of the algorithm. It includes the development of a neural network (to collect and understand the input images), the implementation of machine learning (to enable system to self-adapt and learn by doing) and deep learning (to reinforce its ability by working on big amount of data).

The proposed platform aims to analyse emotions and behaviour of the customer along the journey in a non-intrusive way.

The great EMOJ challenge is that the system works in real time. This guarantees the respect of GDPR 2016/679 about privacy, because images are suddenly processed and then throw away, without any association between the person's name or ID and his/her face. Moreover, EMOJ technology can detect people's emotional reaction to a specific element they are interacting with, in every single moment and along the whole user journey. This tool that can recognize the emotions a person is feeling and its intensity. The kind and the intensity of an emotion are related to what that person is watching (or listening, or tasting) in that precise moment, so EMOJ's platform can give important informations on the emotive impact of every choice made at different level and from different business units.

The system adopts two different strategies to capture the user's emotions and make the experience adaptable and reactive. It acts directly on the environment that surrounds the person to improve his/her experience in a reactive manner. Furthermore, it provides a decision support system (DSS) able to help the manager in defining the optimal CX strategy and in planning the actions to be taken for the short and long term. For this reason, EMOJ's technology can help a business to get in touch with its customers in many ways, giving important information for marketing, communication and CX managers.

The concrete applications of this technology are countless, both in physical and digital world. For what concerns the first, EMOJ has already worked in projects in the fields of automotive, retail and audience measurement.

For example, one of the most important project realized by EMOJ was the emotional detection in retail contexts, where it was used to track customers' behaviours in the moment of the evaluation of the products (Ceccacci et al., 2018). Compared to the other tools and methods for emotional recognition and analysis, EMOJ presents many advantages such as:

- Non-invasive solutions that integrates several technologies;
- Modular architecture of technologies that let each module work as a stand-alone tool, so that the functionality of the system is not compromised when modules are missing;
- Web-based user interface, easily accessible remotely yet protected by security protocols. Thus the user can access data in a cloud-based environment;
- Emotion recognition technology inserted in a customer experience context.

In the digital domain, EMOJ technology can be embedded in e-commerce platforms, to improve the conversion rate, reduce the number of abandoned carts and increase revenue. It allows the e-commerce to know precisely which elements of each web page is more effective in attracting user's attention, or where the user is exactly watching, in order to modify texts, pictures, marketing campaigns and offers based on those informations. EMOJ makes possible to evaluate every part of the text, images, videos, calls to action, links and other elements that can contribute to increase the sales of the e-shop.

Another example of digital application of EMOJ is in e-learning platforms, to measure the students' levels of attention and engagement. This is very useful to certify that who attend an online course is actually participating and understanding its contents, but also to compare teachers' ability, based on student's levels of engagement and attention and on the changes of their emotional state during the lesson.

Case study: The Macerata Opera Festival

One of the most interesting application of EMOJ concerns the Culture. In summer 2019 EMOJ started a collaboration with "Arena Sferisterio Association", in a medium-term project to improve the artistic performance by measuring the audience of the Opera Festival live shows applied its technology in opera live shows, held at the open-air Roman theatre Arena Sferisterio, in Macerata (Italy).

The Association wished to analyse the emotive state of the audience during the representations of Macerata Opera Festival and measure its satisfaction and appreciation level, in order to structure an offer able to better attract spectators to the next editions of the festival, expected for summer 2020. This could lead to a positive impact on ticket sales, as well as on the image and diffusion of the brands Macerata opera festival, Sferisterio Arena and city of Macerata.

EMOJ monitored a sample of twelve people of the audience during ten representations of the *Carmen*, *Macbeth* and *Rigoletto* (operas held in the 2019 summer season), and measured the levels of attention and the feelings aroused by every show (Figure 1).

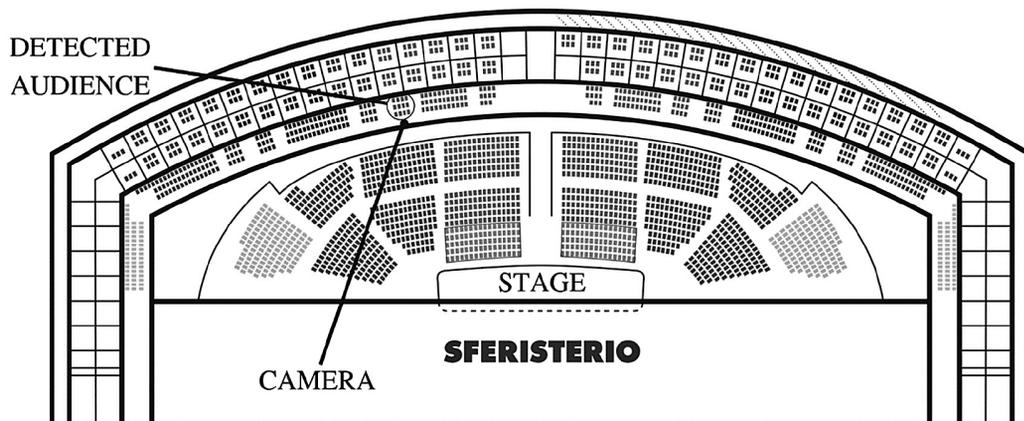
monitoring of the twelve persons are aggregated for each opera and for each type of shows (e.g. *Macbeth*, *Carmen* and *Rigoletto*).

Audience selection to be live monitored is based on the representing Sferisterio's buyer personas. Actually, the sampled audience was not randomly chosen; individuals were selected to correspond to the five Sferisterio's buyer personas, found thanks to surveys submitted in the last two seasons of the Macerata Opera Festival and to market research on open-air theatres.

The most important part of the first phase is a strategic benchmark with competitors' offers, which deeply investigated many important aspects, such as:

- The titles and number of the representations scheduled by each competitor for the 2019 summer season;
- Tickets prices and the number of price levels of the different tickets;
- The applied discounts for groups or individuals (old/young/babies/disabled), and for cumulative tickets (valid for more than one show);
- The collaboration with no profit associations;
- The integration in the local touristic offer;
- The general communication, with analysis on the main marketing messages and brands positioning;
- Competitors' websites, including aspects such as user experience, search engine optimization

Figure 1. Map of the Sferisterio Arena and theatre area subjected to monitoring



Source: author's own work.

Monitored data are mapped with the duration of each opera act, each aria and relative musical features link audience reactions to the opera characteristics. It is then possible to understand the real impact of the choices made by art director and conductor on the audience and the level of the perceived quality. Collected data from the

and advertising, the user journey from the home page to the ticket purchase, the quality of pictures and the usability of the website design;

- Competitors' use of social networks, investigating the quality of the content and the ability to build a strong community.

The second phase of Associazione arena Sferisterio's marketing plan is a new and deeper analysis on the audience of the shows of the 2019 summer season. The results of EMOJ's emotional analysis of the audience are the central point of the study on the experience lived by Sferisterio's customers. It provides precise indications on every moment of all the shows, in order to compare the appreciation and emotions aroused by every event that takes place on the stage.

EMOJ's emotion detection represent the qualitative investigation, while the quantitative one is an audience survey for every show and another survey in the box office (in the purchase moment), to investigate the appreciation level on a big amount of people in the audience.

The integration of the results of the two analysis will allow the Associazione arena Sferisterio to understand in which elements to improve its offer, both in the aspects strictly related to the representations, and in all the other elements that can lead to an increase in the perceived quality.

The main goal of the project is not only to improve the quality level of the representations, but also to understand how to improve other factors, such as the logistic organization and the communications activities.

The aim is to get better the full festival offer, which includes other kinds of shows, such as rock concerts and ballets. Moreover, the festival is strictly related to the touristic offer of the Marche region, collaborating in many activities with cultural operators, receptive structures and food and wine local companies.

The third part of the marketing strategy is the integration of the results of EMOJ's analysis in the global strategy for the Macerata Opera Festival 2020.

The mid-term planning of opera season is made once every three years, and the summer 2020 has been planned along with 2019 and 2018. Widening the statistical analysis with new surveys and adding EMOJ's emotional tracking results, make possible for Associazione Arena Sferisterio not only to improve the performance of 2020, but also to make a better strategic planning for the next three years, until 2023.

Experimental results and discussion

The following figures (Figure 2–5) show the results of the emotional analysis carried out on the audience of the Macerata Opera Festival for all monitored shows. The pie graph on the left shows the prevalence of felt emotions for the whole show. The blue curve on the right represents the

emotional valence. Valence is positive or negative affectivity. It could be described by bipolar scales that, in aggregate, defined a continuous dimension from pleasantness (happy, pleased, hopeful) to unpleasantness (unhappy, annoyed, despairing) (Bradley and Lang, 2000). The values on the abscissa refer to the monitoring time (i.e., once every 2 minutes). The values on ordinates represent the following levels of valence:

- 0 corresponds to the neutral condition, when the person is in a state of relaxation and well-being;
- 100 corresponds to "happiness", the maximum level of satisfaction experienced by the person;
- From 1 to 99 positive emotions are present and the value 50 corresponds to surprise;
- From -1 to -99 the negative emotions are represented. They pass from different levels of sadness, which correspond mainly to the feeling of boredom and disgust that appears in moments of poor pleasantness of the experience;
- -100 corresponds to anger, the condition where the person experiences feelings of annoyance and frustration.

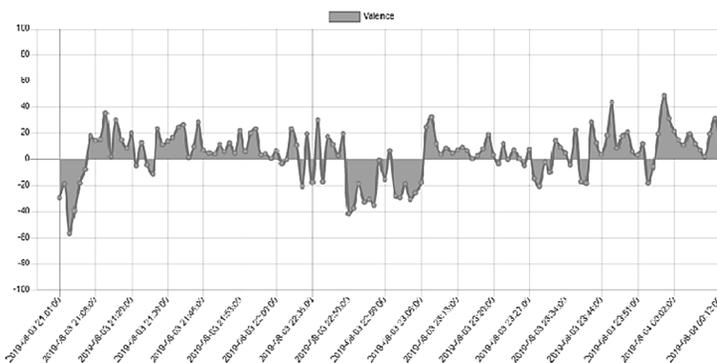
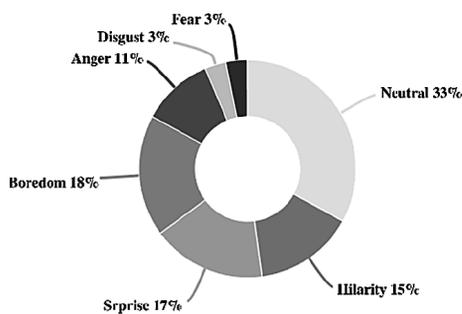
The "neutral" state corresponds to a state of relaxation, while the "sadness" one to boredom. Anger and disgust can be considered as states of annoyance and frustration that derives from a low interest in the show or indicate an unpleasant sensation.

The value of valence is the average value of the emotions felt by all monitored persons. This means that a zero valence can represent not only a moment of general relaxation, but also a result of contrasting monitoring, such as a scene that arouses positive emotions for a person and negative feelings for another one, at the same time.

Valence values are represented with both a pie graph, reporting the percentage of the felt emotions for the whole show, and a curve in a Cartesian space with the registered values for the opera duration. 11 valence graphs are obtained in total, i.e. 4 for *Carmen*, 4 for *Rigoletto* and 3 for *Macbeth*. Figure 2, 3 and 4 present an example of them while Figure 5 shows the aggregated results for the *Macbeth's* opera.

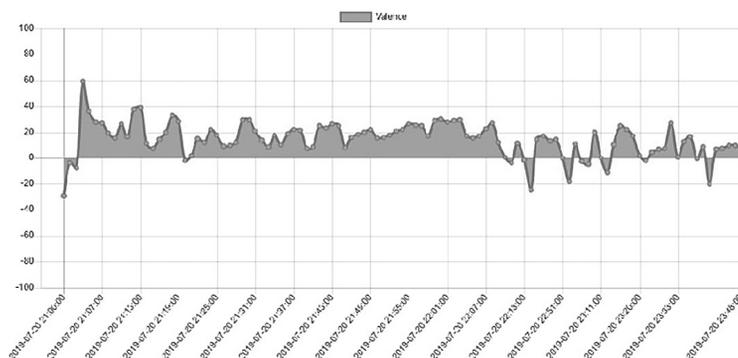
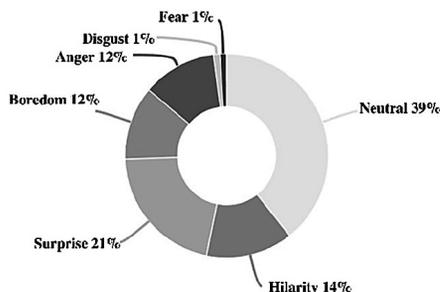
The comparison of the valence curves of the same opera in the same graph highlights differences of the artistic performance in the diverse events (Figure 5) and which aria arouses enthusiasm and joy. For instance, in *Carmen*, the Opera company maintained the same level of audience arousal in acts N.1, 2 and 4, while audience experience varies in act N.3. In addition some contextual factors can affect emotions. An example is weather (e.g. unexpected cold or rain). The rain affected the *Carmen* of 28th July (Figure 2). This is demonstrated by the more negative peaks at the beginning of the second half of the show. Other factors that can affect the emotional

Figure 2. Pie graph and the emotional valence curve for one Carmen's show



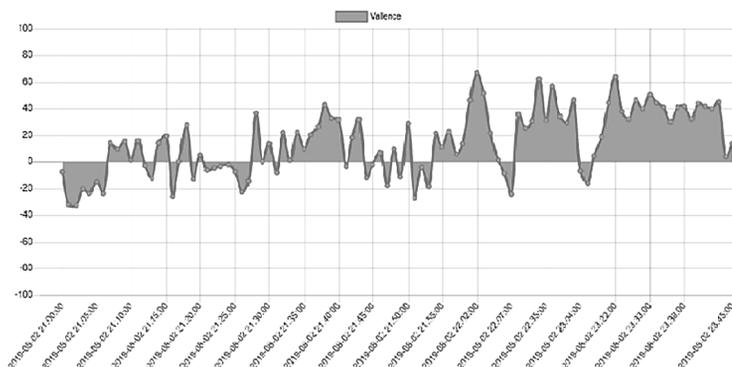
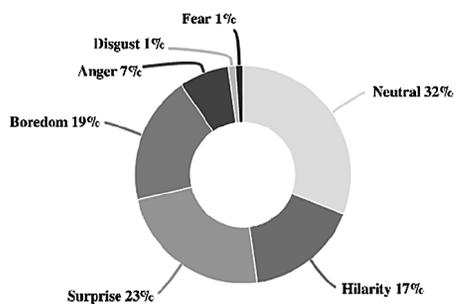
Source: author's own work.

Figure 3. Pie graph and the emotional valence curve for one Macbeth's show



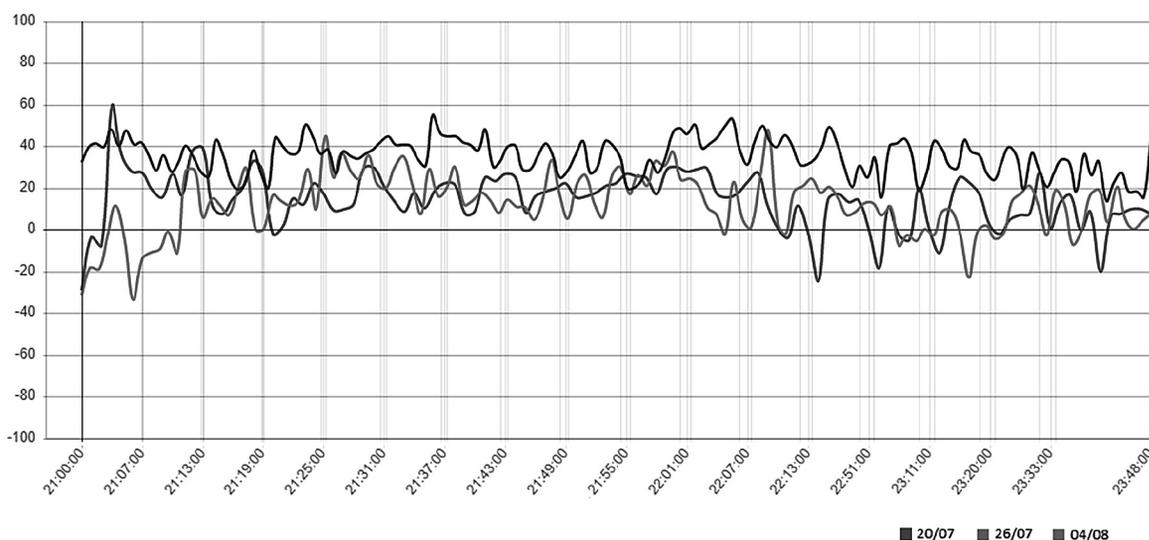
Source: author's own work.

Figure 4. Pie graph and the emotional valence curve for one Rigoletto's show



Source: author's own work.

Figure 5. Comparison of the audience experience in all Macbeth's shows



Source: author's own work.

Table 1. Most appreciated opera arias

| Carmen | Macbeth | Rigoletto |
|--|--|---|
| <p>The "Prelude" (first scene of the first act);</p> <p>"L'amour est un oiseau rebelle" (Carmen's habanera), the opera's most famous aria, about the untameable nature of love (at the half of the first act);</p> <p>"Votre toast, je peux vous le rendre" ("The Toreador Song"), another very famous Carmen's aria (at the beginning of the second act);</p> <p>"La fleur que tu m'avais jetée", a lovely duet between Carmen and Don José (conclusion of the second act).</p> | <p>"Vieni! t'affretta!" ("Come! Hurry!"), when Lady Macbeth is introduced in the plot, determined to propel Macbeth to the throne which is the cause of several murders (second scene of the first act);</p> <p>"Si colmi il calice ("Fill up the cup"), when Macbeth see Banco's ghost (third scene of the first act);</p> <p>"Ah, la paterna mano" ("Ah, the paternal hand"), when Macduff is determined to avenge the deaths of his wife and children by Macbeth (first scene of the fourth act);</p> <p>The chorus "Patria oppressa" ("Down-trodden country"), when the Scottish refugees stand near the English border before the battle (first scene of the fourth act);</p> <p>"Una macchia e qui tuttora" ("Yet here's a spot"), Macbeth's most famous scene, when Lady Macbeth is sleepwalking shocked by guilt about the deaths she caused (second scene of the fourth act).</p> | <p>"Gualtier Malde!... Caro nome che il mio cor" ("Dearest name"), when Gilda meditates on her love for the Duke, whom she believes is a student (half of the first act);</p> <p>"Ella mi fu rapita!" ("She was stolen from me!"), when the Duke is concerned that Gilda has disappeared (beginning of the second act).</p> <p>"La donna e mobile" ("The woman is fickle"), Rigoletto's most famous aria that is a real showcase for tenors. Here the Duke reflects on the personal vision of emptiness and female inscrutability, where the woman is seen as susceptible to changes both in thoughts and in words at the first change in mood and the course of events (beginning of the third act);</p> <p>"Cortigiani, vil razza dannata" ("Accursed race of courtiers"), Rigoletto attempts to run into the room in which Gilda is being held, but the courtiers block his way (half of the second act);</p> <p>"Who ingannato, colpevole fui" ("Father, I deceived you"), when Gilda says she is glad to die for her beloved (final duet).</p> |

Source: author's own work.

experience regard the main events of a scene (e.g. a lovely kiss between the two main actors, the moment of murder, the entrance of the whole company), the expressiveness of the actors, the orchestra performance, the scenography elements changing during the different opera sessions, etc.

Another general tendency recorded by the emotional detection is a higher value of the valence in the sung parts than in the spoken ones. This suggest us that the orchestra is one of the most important elements that define the engagement level of the audience.

Moreover, positive peaks are recorded in correspondence of the most famous arias, or in the most meaningful scenes for the plot. Table 1 reports the most appreciated arias for each opera.

The comparison of the three operas' average valence allows the study to focus on how the audience experiences emotions and to indicate which opera was mostly appreciated (Figure 6). The results show that the most appreciated opera is *Macbeth*, with a higher value of valence and that *Rigoletto* mostly excited the audience than the other operas (i.e. lowest value of neutral state percentage)

A more accurate analysis is possible by mapping the emotional curves with the video

time of the shows. They depend on some operative factors such as the video recording start and stop during acts' pauses that were manual.

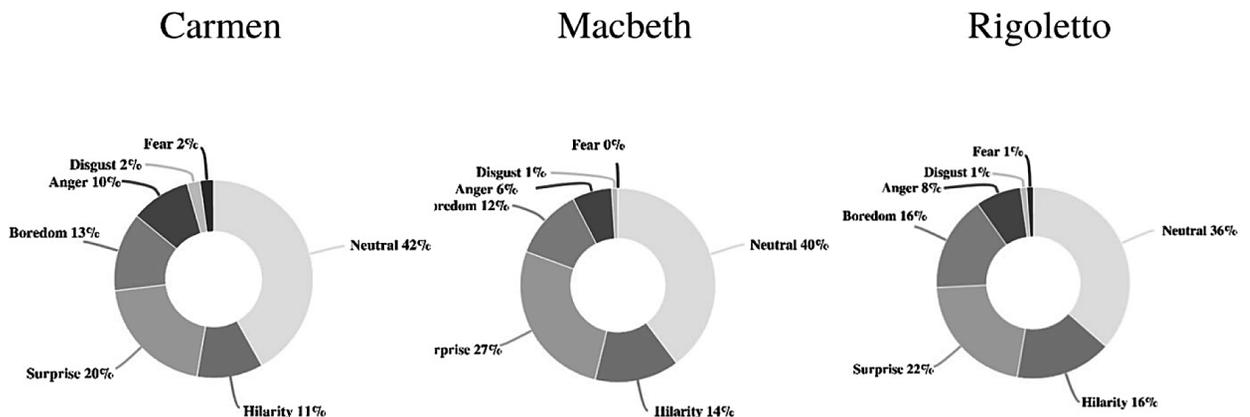
As a consequence, the emotional curves of the same opera are not perfectly synchronized. Comparison and research findings are not strongly affected by this gap.

Conclusions

CX is becoming very important not only in leading business strategies, but also in improving artistic performance and hence increasing culture attractiveness. The audience is like the customer. The only way to keep customers loyal is offering them memorable and custom experiences, not only when they purchase our products and services, but also every time there is a contact between an offering and a person.

Tracking people's emotions and instinctive reactions to marketing inputs is the challenge to win. Only what is measurable is manageable, and the capability to acquire a big amount of customer's data is more important than ever, because it is from data that companies set their goals and builds their strategies.

Figure 6. Overall emotional experience of Carmen, Macbeth and Rigoletto



Source: author's own work.

streaming of the same show. This allows the audience emotions to be related to what happens stage by stage. Audience experience mapping results to be a useful tool for the art director to improve the general performance by correcting specific opera elements.

A specification is due for the complete understanding of the above reported graphs. There are some differences in the monitoring

EMOJ developed one of the most useful tools enabling the measurement of emotional without being invasive and intrusive. It gives companies the opportunity to know a person's emotive state in real time, and to offer personalized experiences based on behaviours and feelings recorded. This is a powerful marketing tool that has already been applied in many different contexts, both in the physical then in the digital world.

On summer 2019, an interesting application of EMOJ tool took place in Macerata, when it is used to monitor the emotions aroused on the audience by opera shows, in the Arena Sferisterio for the Macerata Opera Festival. A sample of 12 spectators for each show were recorded and analysed in real time. An overall of 11 shows were tracked and the felt emotions are mapped for every part of the dramas. The presented work reports the

experimental results and a discussion of the impact of the analysis on the culture sector. In addition to emotional analytics a survey was submitted to 800 attending Opera visitors to understand the appreciation level of the shows and the perceived quality of the entire festival. The study of the survey data combined with the emotional analytics investigation provides a roadmap for the Sferisterio Association to improve the next year opera season.

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Polskie Wydawnictwo Ekonomiczne

Podręcznik prezentuje rozwój myśli ekonomicznej na tle zmieniającej się gospodarki – od XVIII do końca XX wieku. Od XVIII wieku główną formą gospodarowania jest gospodarka rynkowa, dlatego ówczesnie sformułowane teorie i powstałe nurty myśli ekonomicznej są w dużej części nadal aktualne i wykorzystywane w formułowaniu wytycznych dla polityki gospodarczej. Z tego powodu poznanie historii myśli ekonomicznej jest niezbędne dla zrozumienia zasad funkcjonowania współczesnej gospodarki.

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