Distinctive features of a senior's face from a communicative perspective

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Abstract: This research is the first step of a project concerning a comparative analysis of the image of the elderly present in public space of Warsaw and Berlin. The primary aim of the study was to analyse the seniors' faces in order to identify the determinants of the corporeal physicality of the human face on the basis of which a given face is classified as belonging to an elderly person. The next goal was to construct an optimal model of the senior's face based on the set of the recognised determinants. The ultimate objective was to develop a feature-based algorithm which will be used in the objectified process of identifying and categorising faces in terms of age. The algorithm will be further applied in the project regarding visual communication, where messages available in public space should be selected according to the criterion of presenting the elderly. The research method was a diagnostic survey and for the data collection, a survey questionnaire was used as a tool. The work was supported by the National Science Centre, Poland, under the research project "The image of older adults in the public space of Warsaw and Berlin" no UMO-2021/43/B/HS2/01288.

Abstrakt: Niniejsze badanie stanowi pierwszy etap projektu dotyczącego analizy porównawczej wizerunku osób starszych obecnego w przestrzeni publicznej Warszawy i Berlina. Podstawowym celem badań była analiza twarzy seniorów w celu zidentyfikowania wyznaczników cielesności ludzkiej twarzy, na podstawie których dana twarz jest klasyfikowana jako należąca do osoby starszej. Kolejnym celem było skonstruowanie optymalnego modelu twarzy seniora w oparciu o zbiór rozpoznanych wyznaczników. Ostatecznym celem było opracowanie algorytmu opartego na zidentyfikowanych cechach, który zostanie wykorzystany w zobiektywizowanym procesie identyfikacji i kategoryzacji twarzy ze względu na wiek. Algorytm będzie miał zastosowanie w projekcie dotyczącym komunikacji wizualnej, gdzie komunikaty dostępne w przestrzeni publicznej będą dobierane według kryterium przedstawiania osób starszych. Metodą badawczą był sondaż diagnostyczny, a do zbierania danych wykorzystano kwestionariusz ankiety. Badanie zostało sfinansowany ze środków Narodowego Centrum Nauki przyznanych na podstawie decyzji numer DEC-2021/43/B/HS2/01288 dotyczącej projektu „Wizerunek osób starszych w przestrzeni publicznej Warszawy i Berlina".

Key words: face, communication, senior, old age

Słowa kluczowe: twarz, komunikacja, senior, starość

Introduction

The research presented in the paper focuses on the distinctive features of a senior's face from a communicative perspective. It is a part of a larger project *The image of older adults in the public space of Warsaw and Berlin* supported by the grant OPUS 2021/43/B/HS2/01288 financed by the National Science Centre, Poland, which aims at examining and comparing the image of older adults created on the basis of the messages available in public space of the capital cities of two neighbouring European countries (Poland and Germany). The main assumption of the project is that there are substantial differences in the social and financial status of seniors in Poland and Germany and the aim is to provide an analysis of the hypothesised differences between the image of older adults in the public space of Warsaw and Berlin with regards to language and visual resources. Since messages in the public space take the form of posters, billboards, leaflets, advertisements, announcement, playbills, etc. they belong to the visual type of communication representing a 'graphic order of communication' (S. Puppel, 2012). This particular communication order incorporates both linguistic and non-linguistic resources, the choice of which makes it possible to classify the presented people as elderly. Therefore, the process of identification of those portrayed as seniors can be realised in a few distinct ways. First, the linguistic resources may contain explicit information on demographic age, which can be realised in a numerical and lexical way, e.g. over 60, 65-plus, seventy. Second, it can be indicated with an appropriate choice of lexical items, such as grandma, grandfather, senior. Third, belonging to the population of the elderly may be visually denoted by specific elements of physical appearance, for instance, deep wrinkles, loss of hair, or old-fashioned clothes or hairstyles.

The first stage of developing a matrix for the objectivised analysis of nonlinguistic content is to establish the criteria for the process of identification of older faces. Thus, the aim of the research is to find a set markers of physical appearance of a face which are perceived as universal indicators of old age in both men and women. The results will serve as a foundation in creating an algorithm which will be designed to help classify a visual message as that presenting an elderly person in the further stages of the main project.

1. Face in public space

Traditionally, the public space is characterised by public ownership, free access, and rule-based organization. Following Iveson (1998:22), public space can be defined as a busy place, with high traffic intensity, pedestrian access, and mixed functions. Among others, these functions include human interaction and communication, which brings the definition closer to a sociological perspective.

From the sociological point of view, urban public space is 'a type of a social space, in which specific relations between an individual and community occur' (Maik, 2011:11, translation mine – KK). It serves as a setting for accidental unplanned encounters and various social interactions (Kohn, 2004). Inevitably, public space, which is usually defined as densely populated, abounds in people, and in human faces. The face, 'the most recognizable part of a human body' (Koszko, 2020:108, translation mine – KK) is at the same time the most expressive index of human existence in the public space, and in communication terms it provides a strong index of performativity, which can be translated into high communicative power (J. Puppel, 2013). Likewise, every feature of a human body possesses a defined semantic indicator and, as a result, a specific communication and mediation value associated with it (S. Puppel, 2016). As J. Puppel (2011:82, translation mine – KK) claims, the 'human face is a special means of communication (…) and as a separate part of the human body, it is of a particular importance in public space and public communication'. In this context, 'facework design' is the most significant element of indexical communication in visual culture (Kowalewska and Puppel, 2017:496) and face is a central element of a human communication potential, which can be used in an infinite number of communication encounters.

2. The face in communication

As has been said above, the face has its own semantic index and is the most basic tool in initiating, conducting, or maintaining social interaction (Kowalewska and Puppel, 2017). The face is, next to the hands, the most expressive component of the human body (J. Puppel, 2011:81) and also the main channel for transmitting verbal and nonverbal messages. With its skeletal, muscular and nervous system, the face is responsible for, among other things, human speech production (J. Puppel, 2011). It is equipped with all the necessary muscles and smaller body parts to be able to generate sound and thus spread language. Its role in nonverbal communication is equally important. Through muscle activity and facial expressions, it is capable of conveying emotional states. A smile, a frown, a gaze are elements of expression without which communication would be much poorer and much more difficult. Furthermore, it is the 'primary source of visual information for identifying people and reading their emotional and mental states' (Todorov and Oosterhof, 2011:117). In European culture, the face is a part of the body that remains uncovered regardless of the season, which facilities not only recognition of a person but also communication, especially in the face-to-face mode. The meaning of the face for communication was particularly noticeable during the pandemic of COVID-19, when wearing face masks was obligatory, which generated a whole range of difficulties when communicating verbally.

3. Naked vs ornamented face

The social significance of the face is 'evidenced by the presence of its image in all important documents, such as an identity card, passport or driving licence' (J. Puppel, 2016:202, translation mine – KK). However, even though every face has a set of permanent anatomical features characteristic for a given individual, which help to determine one's identity, it is still subject to dynamics (Jack and Schyns, 2015). This dynamics is connected not only with the changeable and adaptable structure of the face, but also with the deliberate use of facial ornaments. In the history of human evolution, the face has always appeared as either the so-called 'naked face' or 'ornamented face' (J. Puppel, 2016:202). The qualities and quantities of the ornaments are strictly determined by the culture and sub-culture they are embedded in. The ornamentation of the face may involve, among others, 'additional external features (any ornamentation applied to the skin or hung on the face), such as makeup, tattoo, earrings, rings, studs, beads, pendants, etc.' and may indicate individual or collective identity as well as highlight some of the universal sates, for example, aggression, wealth, power, or age (ibid.: 202; see also Jack and Schyns, 2015). The face will therefore be the embodiment of individual and cultural differences in the society (Koszko, 2020:109). At the same time, '[t]he face and its attributes have not only the highest communicative status but also a very strong impact on overall image shaping' (Kowalewska, 2018a:64).

4. Determinants of an ageing face

Physical appearance, apart from deliberate modifications (e.g. make-up in women, beards on men, or different hairstyles for both genders), is also subject to ageing processes related to the passage of time. In the biological aspect, it undergoes constant changes and it is usually the face that first reflects a person's age. Due to the fact that face remains uncovered in different weather conditions and is exposed to sunlight throughout the year, its skin ages relatively quickly, and visible symptoms of the skin wear are visible long before a person enters the culturally constructed senior population.

Biologically, a senior's face, as a result of the involution of fatty tissue and re-laxation of the superficial muscular aponeurotic system (SMAS), it is characterized by sunken cheeks, drooping eyebrows, and droopy upper and lower eyelids (Zapała and Szuta, 2012:133). Wrinkle lines on the forehead, around the eyes, cheeks and neck become sharply visible, the nose seems longer and sharper, and the nasolabial folds are deepened, whereas around the mouth vertical wrinkles appear (ibid.:133-134). Researchers have also found that that there are no differences between male and female faces when it comes to the quantity of wrinkles (ibid.:132).

With regard to appearance, old age is associated predominantly with wrinkles and grey hair. Whether based on stereotypes or one's experience, this view seems

to be a regularity repeated in different age groups. Research carried out among young adults aged 19-24 showed that the typical face of an elderly person is associated with wrinkles, grey hair, hair reduction, missing teeth, and damaged skin with visible age spots (Kowalewska, 2018b). Similar results were obtained in the research on the image of elderly people conducted among primary school children in urban and rural areas. Children living in a city mentioned wrinkles and grey hair as the most distinctive features of seniors. Additionally, they pointed to skin or teeth problems and being bald (for men) (Kowalewska, 2018c). As to the accessories, glasses, characteristic earrings and unfashionable clothes were mentioned. Pupils from rural environments drew attention to the same features, adding to them specific haircuts, beards (on men), papules, and bags under the eyes (Kowalewska, 2018d). Generally, research has revealed that the image of the elderly presented by adolescent youths and young adults reflects a stereotyped visual representation of the elderly population.

5. Methodology

The research problem focuses on identifying specific determinants of physical appearance within the face which allow us to categorise it as a seniors' face. Based on the research problem, the following research questions were put forward:

- RQ1 Why is a face perceived as belonging to an elderly person?
- RQ2 What physical features of a face are interpreted as characteristic of a senior?
- RQ3 What does the optimal model of a senior face look like?
- RQ4 What algorithm based on the occurrence of determinants of physical appearance should be used in order to classify a face as belonging to a representative of the elderly population?
- There are three interdependent research objectives.
- O1 The primary objective of the study is to identify the features of the corporeal physicality of the human face on the basis of which a given face is classified as belonging to an elderly person.
- O2 Recognising the set of these determinants will allow the construction of an optimal model of the senior's face, which is a second goal.
- O3 The ultimate objective is to develop a feature-based algorithm which will be used in the objectified process of identifying and categorising faces in terms of age. The algorithm will further be applied in the project regarding visual communication, where messages available in public space are to be selected according to the criterion of presenting the elderly.

The research method was a diagnostic survey, and for the data collection a survey questionnaire was used as a tool. The questionnaire, which was designed by

the author of the research, began with information about the scientific purpose of the survey, the topic and assurance of the anonymity of the data. It also included the demographic variables of the respondents, such the age and gender, which are provided in the details below.

In the questionnaire, there were six photos showing different faces of elderly people (see Picture 1.).

IS1　　　　　　　　　IS2　　　　　　　　　IS3

IS4　　　　　　　　　IS5　　　　　　　　　IS6

Picture 1. Pictures of the analysed faces (Source: press materials, details in bibliography)

Of the people shown in the illustration, three represented the female population and three the male. All of them were over 65 years old at the moment of taking the picture, which is the age that classifies a person as senior according to a number of international sources (among others, the World Health Organisation, United Nations). Under each picture, which were arranged separately, there were two questions. The first one *Do you perceive this face as belonging to an older person?* gave the opportunity to choose from three possible answers: *yes*, *hard to say*, and *no*. This closed question was followed by an open-ended one *If so, which facial features classify this person as older?*, in which the respondents who chose the answer *yes* were asked to identify those features of the appearance of the people shown in the photos that, in their opinion, should be interpreted as characteristic for an elderly person.

The research group included 225 respondents, of whom 27 (12%) were men and 198 women (88%). The age range of the respondents was from 18 to 48 years, and most of them were between 23 and 27 years old (see Table 1.).

No.	Age	N	%
1.	18-22	86	38,2
2.	23-27	93	41,3
3.	28-32	16	7,1
4.	33-37	18	8,0
5.	38-43	6	2,7
6.	44-48	6	2,7
7.	total	225	100

Table 1. Age groups of the respondents

The choice of young adults as a dominant population for the study group was justified by the nature of the subject matter. The main aim of the study was to examine the physical markers of old age, so mature adults and the elderly may find it more difficult to determine the markers, as they may identify themselves with that population and therefore be less objective.

The total number of all answers provided was 3,936, which comprised 146 semantically diverse categories of determinants that help classify a face as belonging to an elderly person. They were grouped into areas and presented in 19 corresponding tables. The answers that were mentioned only once were placed in a collective line with an asterisk at the bottom of the table. Although the tables below provide a quantitative layout of answers, the stress is put on the qualitative analysis.

6. Research results

Skin ageing is a natural and inevitable process which involves a set of changes that progress over time. It includes, among others, decreased biological activity of cells, slowed regeneration, and reduced response to oxidative stress. The first symptoms of ageing are usually visible on the face, as facial skin is very delicate, and at the same time prone to frequent exposure to the sun, wind, heat or cold, or make-up on women. Previous research by González-Alvarez and Sos-Peña (2023) revealed that anatomical changes in facial structure, skin tone, and texture are the principal visual signs, and the main sources of information for estimating the age of people. The results of this research largely confirm those findings. In fact, the largest number of answers indicated that the primary feature that is associated with ageing is the presence of wrinkles (see Table 2.).

Lp.	Answers	N	%
1	wrinkles	976	75,4
2	around the eyes	75	5,8
3	numerous	66	5,1
4	lines on the forehead	55	4,2
5	lines around the mouth	54	4,2
6	deep	36	2,8
7	visible	16	1,2
8	laughter lines	13	1,0
9	slight	2	0,2
10	frown lines	2	0,2
total		1295	100

Table 2. Wrinkles

In the context of wrinkles, the respondents pointed to certain face areas, such as *around the eyes* or *around the mouth*. These are the areas, in which wrinkles appear first due to the fact that the muscles surrounding the eyes or the mouth are the most often used, and therefore the skin wears faster. Additionally, qualities of the wrinkles were described, for example, *deep*, *visible*, or *laughter lines*.

Generally, the facial ageing process starts with a change in the skin's condition, which includes, aside from wrinkles, age spots, dryness or loss of skin volume. Table 3. and Table 4. present the condition of the skin and the presence of skin lesions that were associated with advancing age.

Lp.	Answers	N	%
1	sagging / loose / flabby	125	59,8
2	inelastic /less elastic / low elasticity / lack / loss of firmness	37	17,7
3	damaged	14	6,7
4	dried/dry	10	4,8
5	dull / fatigued	7	3,3
6	old/ageing	6	2,9
7	ashen/grey	4	1,9
8	neglected	4	1,9
9	weary	2	1,0
total		209	100

Table 3. Skin (condition)

Mainly, the results of the loss of facial tissue were noticed, for instance, *sagging*, *loose*, or *inelastic skin*. Nevertheless, poor skin quality was also underlined with answers including *damaged*, *dry* or *dull*.

Continuing with the condition of the skin, the presence of skin spots of various types, and uneven skin tone was stressed (see Table 4.).

Lp.	Answers	N	%
1	skin discolouration	61	40,7
2	age spots	52	34,7
3	skin lesions	13	8,7
4	birthmarks	8	5,3
5	freckles	5	3,3
6	liver spots	5	3,3
7	blackheads / blood spots / extensive pores / moles / papules / warts	6*	4,0
total		150	100

Table 4. Skin lesions

While some of the listed skin lesions are an effect of the natural process of ageing (e.g. *skin discolouration* or *age spots*), others may result from dysfunctions of bodily organs or diseases (e.g. *liver spots* or *blood spots*). Yet, others may not be biologically or medically related to ageing, but still their presence is translated into being typical of old age (*birthmarks* or *freckles*). According to research on facial ageing, the volume of skin age-related discolouration is, in general, lower at women (Zapała and Szuta, 2012:132).

Beside the qualities of the skin texture and tone, hair colour was frequently indicated. Grey hair is considered to be one of the most universal signs of advanced age. Research suggests that hair greying, which is a consequence of the loss of pigment production resulting from oxidative damage, is highly correlated with chronological age (Westgate, et al., 2013). It should, however, be mentioned that in this respect there are differences when it comes to race. Although the average age for hair to start greying is mid- to late forties, for Caucasians it is the mid-thirties, for Asians late thirties, and for Africans mid-forties' (Maymone et al., 2021; Westgate, et al., 2013).

Answers given by the respondents show that a person is perceived as a senior when their hair is not only devoid of colour (perceived as *grey* or *white*) but also of poorer quality (*sparse*, *thin*, *weak*) (see Table 5.). The condition of hair is closely related to the ageing process, as with age the density of follicles on the scalp decreases, which makes hair seem thinner (Maymone et al., 2021:39).

Lp.	Answers	N	%
1	grey	449	50,6
2	sparse	46	5,2
3	white	19	2,1
4	thin	9	1,0
5	weak	7	0,8
6	falling out	5	0,6
7	curls / changes in the hair / damaged / frizzy long / stiff structural	6*	0,7
Men's hair			
8	baldness / lack of hair	155	17,5
9	partial baldness / partial loss of hair/ less hair / little hair	60	6,8
10	receding hairlines / high forehead	49	5,5
Women's hair			
11	haircut typical for seniors	49	5,5
12	short	21	2,4
13	perm	7	0,8
14	curly	5	0,6
total		887	100

Table 5. Hair

In addition, it was observed that there are gender-related differences in the perception of age based on hair. The features that were mostly raised for men were those connected with quantity rather than the quality of hair, and included *baldness*, *partial baldness*, *receding hairlines* or *high forehead*. It means that besides colour, or rather its lack, it is the loss of hair that is a visual marker of old age among men. For women, it was the hair style that meant they were perceived as elderly, with the most common answers comprising *haircut typical for seniors*, *short*, and *perm*.

In social interactions, apart from physical appearance, eye-contact plays a huge role. Although it is culture-specific, and its presence and duration can be different depending on the given country, it is universally acknowledged to be a fundamental element of nonverbal communication (Kowalewska and Puppel, 2017:502). Eye-contact is believed to help decode nonverbal cues, maintain a conversation, show and read emotions, as well as be an indicator of attention, respect and interest (Kowalewska, 2018a). Though learnt by humans in an unconscious way, eye-contact is a natural behaviour and the first 'activity' in interaction with another person, whether in face-to-face communication, or even when looking at someone's picture. For this reason, much attention is paid to the eyes and the area around them. This focus on eyes was reflected in a large number of answers regarding the

qualities of eyes (see Table 6.) and other body parts in the immediate vicinity of the eyes, such as eyebrows (see Table 8.) or lashes (see Table 9.).

Lp.	Answers	N	%
1	drooping eyelids	191	57,2
2	sunken eyelids / sunken eyes	38	11,4
3	crow's feet	26	7,8
4	small eyes	24	7,2
5	bags under the eyes	19	5,7
6	squinty eyes	13	3,9
7	dark circles	8	2,4
8	drooping eye corners	7	2,1
9	narrow eyes	3	0,9
10	wrinkled eyelids	2	0,6
11	brightened iris / swollen eyes / teary eyes	3*	0,9
total		334	100

Table 6. Eyes and eye area

With regard to the eyes, *dropping eyelids* were the most repeatedly mentioned feature (signalling old age), which was followed by *sunken eyelids*, *sunken eyes*, *crow's feet*, and *small-sized eyes*.

Interestingly, when it comes to the eyes, the respondents interpreted the above mentioned physical properties into corresponding qualities of the gaze, mental states, and emotions attributed to their owners, such as *tiredness*, *sadness*, *experience*, or *wisdom* (see Table 7.).

Lp.	Answers	N	%
1	tired eyes	49	40,8
2	gaze	22	18,3
3	sad look	19	15,8
4	experienced gaze	12	10,0
5	wise look	6	5,0
6	thoughtful gaze	4	3,3
7	calm	2	1,7
8	cheerful	2	1,7
9	serious	2	1,7
10	mature	2*	1,7
total		120	100

Table 7. Gaze

In order to continue with the eye areas, the results on eyebrows and eyelashes are presented in Table 8. Despite the fact that *grey eyebrows* are pointed to most often for both elderly men and women, the perception of their qualities seems to be differentiated by gender.

Lp.	Answers	N	%
1	grey	46	35,7
2	long	3	2,3
3	short / reduced / thin / weak / old / unkempt / negligible / lowered	8*	6,2
	Male eyebrows		
4	bushy	21	16,3
5	thick	7	5,4
6	lush	6	4,7
	Female eyebrows		
7	invisible	15	11,6
8	sparse	12	9,3
9	lack of eyebrows	11	8,5
total		129	100

Table 8. Eyebrows

The results show that men will be perceived as elderly when their eyebrows are *bushy*, *thick*, and *lush*. Women, on the contrary, when their eyebrows are *invisible*, *sparse* or *non-existent*. This means that for men it is an excessive amount of eyebrow hair that reveals advanced age, while for women – its insufficient volume. With the eyelashes, no gender dependence was observed (see Table 9.).

Lp.	Answers	N	%
1	grey	7	43,8
2	lack of eyelashes	4	25,0
3	invisible	3	18,8
4	reduced	2	12,5
total		16	100

Table 9. Eyelashes

Eyelashes were not crucial for age identification, as they achieved a low number of answers. Nevertheless, *grey* or *hardly visible* eyelashes contributed to the impression of representing a senior's face.

Another face area that attracts considerable attention in interpersonal communication is the lips. The lips, together with the eyes, are the most dynamic parts of the face and thus play a very important role in nonverbal communication. Able to perform micro expressions, they are capable of conveying a whole range of emotions from happiness, through sadness to anger or fear. As a response in a conversation, they can be compressed, pursed, relaxed, or stretched into a smile. Hence, it is natural for people to observe their interlocutor's lips in order to recognise particular facial expressions and to complement the verbal message. Respondents' remarks concerning the lips refer predominantly to their size (see Table 10.).

Lp.	Answers	N	%
1	narrow	55	35,9
2	small	34	22,2
3	drooping corners of the mouth	29	19,0
4	deflated	14	9,2
5	narrow	11	7,2
6	wrinkled	3	2,0
7	with blurred contours	3	2,0
8	invisible	2	1,3
9	dry / stretched	2*	1,3
total		153	100

Table 10. Lips

The emphasis placed on lip size is rooted in biology, as, with age, collagen levels in the skin decrease, which results in loss of lip volume. Combined with the process of weakening of the lip muscles, it gives the impression that the lips become thinner and lose their contour and shape. This, in turn, is rightly interpreted as a symptom of the process of ageing.

It is common knowledge that age increases the likelihood of tooth decay and gum disease, which makes teeth more prone to breaking, or tooth loss. The average adult has 28 teeth at maturity, but '[a]mong adults from 35 to 44-years-old, 69 percent have lost at least one permanent tooth. By age 50, (…) an average of 12 teeth (including wisdom teeth). And among adults 65 to 74, 26 percent have lost all their teeth' (IS7). It was also estimated that 'the highest rates of missing

teeth occur in people over the age of 55' (IS8). Consequently, it seems justified that missing teeth or visible dentures were identified as symptoms of old age (see Table 11.).

Lp.	Answers	N	%
1	missing teeth	153	96,2
2	dentures	6	3,8
total		159	100

Table 11. Teeth

The missing teeth reinforce the visual impression of narrowed and wrinkled lips and lip areas, which were some of the most frequently given answers (cf. Table 2. and Table 10.).

Next, it was decided to create a 'cheek category' due to a noticeable amount of answers connected with this particular area (see Table 12.). Over time, due to collagen loss in the whole body, the skin begins to drop, contributing, among others, to the appearance of saggy cheeks, pronounced nasolabial folds, and a less defined jawline (IS9).

Lp.	Answers	N	%
1	sagging/dropping	47	61,8
2	laughter lines	20	26,3
3	hollowed	7	9,2
4	swollen	2	2,6
total		76	100

Table 12. Cheeks

In fact, the reduction of the cheeks' firmness and elasticity begins after 30, but then it increases rapidly due to age and gravity's influence.

Although the focus of the research was on the face, the respondents directed their attention to the female neck (see Table 13.), which was another gender-dependent feature.

Lp.	Answers	N	%
1	wrinkled neck	83	93,3
2	flabby neck skin	6	6,7
total		89	100

Table 13. Female neck

The same ageing processes that concern facial skin apply to other body parts. A *wrinkled neck* with *flabby skin* turned out to be a marker of old age, albeit, exclusively in women. As for face wrinkles, there are medical procedures that help maintain skin elasticity, or at least reduce wrinkles, whereas with neck wrinkles reduction aesthetic medicine is still unable to help, therefore the neck area becomes a marker of the passage of time.

Likewise, the presence and colour of male facial hair was a gender-related characteristic (see Table 14.).

Lp.	Answers	N	%
1	grey	25	43,9
2	grey beard	16	28,1
3	grey moustache	12	21,1
4	stubble	3	5,3
5	thinning beard	1	1,8
total		57	100

Table 14. Male facial hair

In men, a face was considered to represent a senior, when possessing a *grey beard*, or *grey moustache*, or both.

There is a popular conviction that the ears and nose grow with age. This illusion stems from the fact that at some point cartilage starts to lose its density and thus stops providing firm support to the skin, making ears and nose perceived as if increased in size. This phenomenon was noticed in the survey for the ears (see Table 15.) and nose (see Table 16.) in both genders.

Lp.	Answers	N	%
1	big	17	73,9
2	enlarged	5	21,7
3	wrinkled	1	4,3
total		23	100

Table 15. Ears

Lp.	Answers	N	%
1	big	15	75,0
2	wide	4	20,0
3	swollen	1	5,0
total		20	100

Table 16. Nose

Not only are the anatomically movable parts of the face subject to dynamics. The face in its 'ornamented' version is a carrier of various adaptable accessories and modifications, some of which may be attributed to age. One of the most distinctive accessories associated with the elderly were glasses, especially of a particular type – *old fashioned*, *with thick lenses* and *transparent frames* (see Table 17.).

Lp.	Answers	N	%
1	glasses	65	47,1
2	glasses typical for a senior	30	21,7
3	thick lenses in glasses	14	10,1
4	glasses that mean poor eyesight	13	9,4
5	old-fashioned	13	9,4
6	big	3	2,2
total		138	100

Table 17. Accessories – glasses

Aside from glasses, types of clothing characteristic for an older person were identified. It included *typical / old-fashioned* outfits, manifested by *floral patterns*, *elegant shirts*, and a *hat* ('garden allotment type hat') (see Table 18.).

Lp.	Answers	N	%
1	typical outfit	17	35,4
2	hat	13	27,1
3	floral patterns	7	14,6
4	elegant shirt	7	14,6
5	old-fashioned style	4	8,3
total		48	100

Table 18. Accessories – outfit

Moreover, it was found that in elderly women certain pieces of jewellery emphasised their age. This was exemplified with *beads*, *pearl necklace*, or *old fashioned rings* – 'grandma's signet ring' (see Table 19.).

Table 19 Accessories – jewellery

Lp.	Answers	N	%
1	beads	14	42,4
2	old-fashioned jewellery	8	24,2
3	old-fashioned ring	7	21,2
4	pearl necklace	4	12,1
total		33	100

7. Discussion

'Man exists in the very important dimension of 'visual culture', in which the human face has always served as the main indicator of the so-called 'external appearance''(J. Puppel, 2016:201). Researchers have found that the most precise information a human face can provide is on gender and age (Gonzalez-Alvarez and Sos-Peña, 2023). Even though the ability to 'read' this type of information on the basis of facial features is heavily influenced by stereotypes, there are some universal elements of external appearance that are responsible for providing information on one's age.

One of the main goals of the research was to find the determinants of the physical appearance of the human face that help classify a person as elderly. After a detailed quantitative and qualitative analysis of the data, it is clear that there are specific areas that carry certain features which can be translated into signs of advanced age. These include wrinkles, skin condition, skin lesions, hair, eyes and eye area, gaze, eyebrows, eyelashes, lips, teeth, cheeks, female neck, male facial hair, ears, nose, and accessories. Tables 1. to 19. above present the results which form a direct answer to the first research question about the reasons why a face is considered to be that of a senior. It was observed that a face needs to possess a set of specified qualities to be recognised as belonging to an older person.

Analysis of the research results can help answer the second research question, concerning particular determinants of a senior's face. It can be stated that primarily, wrinkles, especially around the eyes and in the mouth area, and grey hair tend to be the strongest marker of age in both genders. Remarkably, the mere presence of visible wrinkles and grey hair fails to be sufficient to designate a face as being senior. This is clearly seen in the example of picture no. 4 (see Picture 1.), where the vast majority of respondents wrote *it's hard to say* and added that, despite the wrinkles, for example, the gaze is still lively. Some of the features turned out to be

gender-related as, for instance, in men, baldness or partial loss of hair was under-lined, whereas for women a specific haircut, such as a perm or short hair, along with a wrinkled neck were heavily indicated. Respondents declared that, regardless of the senior's gender, characteristic features of their face are drooping eyelids, missing teeth, and flabby skin, sometimes described as 'inelastic', with discolourations of various origins. Slightly less frequently mentioned qualities were small, narrow lips and sagging cheeks, which make the laughter lines seem deeper. As old age is heav-ily associated with poor eyesight, with regard to accessories, glasses, particularly of an old fashioned style, with thick lenses became a strong indicator of advanced age.

This research allows the construction of an optimal model of a senior's face. With the help of artificial intelligence, hypothetical models of a male senior's (see Picture 2.) and female senior's faces (see Picture 3.) were developed, with the use of the set of features identified in the research.

Picture 2. A male senior's face generated by AI (Chat GPT) based on the features identified in the study

Picture 3. A female senior's face generated by AI (Chat GPT) based on the features identified in the study

The artificially generated faces are a proposed answer to the third research question regarding a hypothetical universal model of a senior's face based on the example of a Caucasian person.

The central goal of the study was to develop a feature-based algorithm to be used in the objectified process of identifying and categorising faces in terms of age. The algorithm can now be applied in projects concerning visual communication, and be helpful in automatic detection of seniors' faces. Having analysed the results quantitatively, it was decided that the process of detection should involve at least three criteria from among those identified in the study. The two dominating features comprise wrinkles and grey hair, and thus their presence will be considered crucial. Nonetheless, they need to be complemented by at least one of the remaining top eight features that received the highest scores, including (1) baldness, (2) dropping eyelids, (3) missing teeth, (4) skin discolouration, (5) sagging skin, (6) narrow lips, (7) wrinkled neck, (8) glasses. The following formula for the algorithm is suggested:

$$\text{senior face} = \text{wrinkles} + \text{grey hair} + {\leq}1/8 \text{ features.}$$

Taking into account the fact that messages in the public space are not given much deliberate attention and the perception process is very brief, only the clearest signals reach our consciousness and contribute to the perception of a person's age.

Concluding, the following statements should be underlined:

- the face is the most expressive indicator of human existence
- facial features largely contribute to the perception of age
- gender determines some of the physical features of an ageing face
- the most common, and universal determinants of physical appearance that indicate belonging to the population of seniors are grey hair and wrinkles, but these are not always sufficient in themselves
- a face can be visually attributed to a senior when it is characterised by the presence of wrinkles, grey hair, and at least one additional age-related feature.

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