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Are Basques ready to visit Australian beaches? Exploring Basque beachgoers? perceptions of Australian beach safety signage

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ABSTRACT

Introduction: This study investigates the knowledge of beach safety and perception of signage that Basque beachgoers would encounter if visiting Australia and also analyses significance differences between Basques and Japanese.
Methods: An online survey was conducted in the Basque Country among 167 participants. The descriptive analysis for quantitative data was conducted using both Excel and SPSS. Open-ended responses were coded for deductive thematic analysis.
Results: Almost half of participants confuse the meaning of the safety flags. Although Basque participants can translate into Spanish every word in beach safety terms, most do not know or give a totally different meaning to these terms. It was found different linguistic and cultural perceptions of the beach signs and terms between Japanese and Basque groups.
Conclusions: It would be advisable to adapt beach safety signage to foreign-born Australian beachgoers, taking into account their different cultural perceptions and understanding depending on their nationality.

1. Introduction.

During the period July 2023 to June 2024, 323 people drowned in Australia, an increase of 7% over the ten-year average, 26% drowned on the beach and about 1 in 4 were born overseas (RLSA, 2024). Focusing only on coastal drownings, the year 2023/24 recorded 150 drowning deaths, the highest number in the last decades, a 22% increase from the last year and 18% increase from the 10 year-average (SLSA, 2024). On the other hand, a study carried out between 2008 and 2018 shows that overseas tourists most commonly drowned at beaches (39.2%) and while swimming (38%) (Willcox-Pidgeon, et al., 2023). Recent statistical data confirms this trend, with 30% (n=189) of drowning deaths on the coast occurring among overseas-born beachgoers between 2013 and 2023, and most of them came from Europe (16%, n=96) and Asia (7%, n=45) (SLSA, 2023). The most common cause of drowning fatalities during 2023/24 was rip currents with 35% (n=29) of the cases and this may be higher since rip involvement remains unknown for 42% of beach cases (SLSA, 2024). Most of the rescues (45.8% n=2992) recorded at 54 South-East Queensland beaches during the period 2016 to 2021 were also attributable to rip activity (Thom et al., 2024). “Rip currents are narrow and concentrated seaward-directed flows that extend from close to the shoreline, through the surf zone, and varying distances beyond” (Castelle et al., 2016). The rip current consists of water pushed up the beach by wave action (the feeder) that moves alongshore towards a relatively narrow flow back into the sea (the neck) until it disperses in the form of a mushroom (the head) (Brew-

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ster, 2005). These currents can reach instantaneous flows in excess of 2 m/s that drag bathers out to sea (Short, 1999; Brander, 2015). Moreover, while there is an intense wave breaking on both sides of the rip currents, a little breaking is observed within the deeper rip channel (MacMahan et al., 2006). Therefore, taking into account that the perceived risks of beachgoers increase with higher wave heights, other potential environmental risk factors as the presence of rips with low energy waves are not perceived however (Dehez, 2024). An added danger is that many bathers, most of whom are males and younger adults, overestimate their ability to swim in the face of potential dangers (McCool, 2009). Frequently, fatal coastal drownings in young male adults in Australia are also related to the consumption of drugs and alcohol (Lawes et al., 2021).

Beach markings and signage are solutions for the prevention of aquatic accidents (WHO, 2003). In addition, current research on beaches in South-West France shows that beachgoers prefer signage information on bathing risks to other means such as lifeguards, brochures/leaflets, demonstrations on the beach (Lyser et al., 2024). Beach signage is particularly important for tourists or individuals who do not frequently visit the beach and are thus, unfamiliar with the ocean environment (O'Halloran; 2025). In Australia international tourists do not make a safe swimming choice in the vicinity of a rip current in comparison to Australian beachgoers and rural inland residents (Williamson et al., 2012). Recently, the results of an investigation in Great Lakes show that while frequent visitors usually chose located locations to bathe further from a rip current, infrequent visitors tended to prioritise convenience such as a short distance to the car park where sometimes closer to rip currents (Houser et al., 2024). However, reading the signage does not necessarily guarantee beach users' safety, because beachgoers may not follow the signs or may not appropriately understand the warning message (Llopis et al., 2018). In addition, some international visitors do not understand the warning message and pictorial information of the signage used on Australian beaches (Shibata, 2024a). This study demonstrated how unfamiliarity of the signage in a foreign country cause misunderstanding of the warning message. The lack of uniformity of symbolism worldwide does not help either (George, 2011). For example, beach safety flags have different meanings between beaches separated by a few kilometres in northern Spain, just in the area where the present study was carried out (Basterretxea-Iribar, 2022). Matthews et al (2014) found that the beach visitors are not always aware of the symbolism used in beach signage and only around 45% of beach users pay attention to signage on Australian beaches. A more recent study in the USA showed a similar finding (only 44% read the signage) and, on the other hand, found that people who read the warning message are more knowledgeable of how to escape a rip current (O'Halloran & Silver, 2024). Therefore, it is important for a city councillor to provide greater focus on locally specific and verified rip forecasts and signage in coordination with lifeguards (Houser et al., 2017).

A recent study investigated how young Japanese university students interpret Australian beach signs (Shibata, et al., 2024b). This study found that almost all Japanese students, who studied English for over 6 years, did not understand the warning message and over half of them interpreted the red and yellow "safety" flags as indicating a danger zone. What is at stake is that although the red and yellow flags are used in Japan, many still do not interpret them correctly. In terms of European countries, their flag systems are quite inconsistent. While countries such as the United Kingdom, Ireland, Portugal, France (Southwestern beaches) and the Netherlands use the same flag system of red-yellow flags as Australia (MDN, 2024; RLSS, 2025; WSI, 2017; SNSM, 2023; RN, 2023); in the Basque Country, two yellow flags are used to mark a narrow guarded swimming area when swell and currents are strong (Basterretxea-Iribar et al., 2022). Because of the inconsistency of the flag system, even the lifeguards on Basque beaches do not know the meaning of the red-yellow flags (Sotés et al., 2020). Considering the high number of drowning deaths of Europeans in Australia, this study aims to assess the degree of knowledge of the symbolism and signs used on Australian beaches among university students and beachgoers in the Basque Country (Northern Spain), where the flag system is different from that of Australia and International Life Saving Federation (ILS, 2019).

An additional aim of this study is to compare a Spanish perception of Australian beach signs with Japanese (Shibata, et al., 2024b). The study of Shibata et al (2024a) highlighted the importance of exploring each cultural perception to understand similarities and differences in the interpretation of Australian beach signs. For this purpose, this study utilises a similar research method adopted in Shibata (2024b) exploring Japanese perceptions of Australian beach signs, and compares the findings of Spanish to that of Japanese. This comparison allows us to demonstrate similarities and differences in the perception of Australian beach signs between a European and an Asian groups.

2. Methods.

2.1. Recruitment and participants.

Recruitment took place at the University and on several beaches along the Biscay coast. A total of 169 people participated in the survey, of whom 96 were university students under the age of 24.

More than 95% of the users of the beaches where the survey was carried out are normally of local origin, with the percentage of foreigners being almost negligible (Gizaker, 2023). This helps us to focus the study strictly on the Basque population. In this sense, more than 95% of tourists visiting Biscay in 2022 were engaged in cultural and/or gastronomic activities, and only 4.3% went to the beach (DFB, 2022).

Given that one of the objectives of the study is to compare cultural perceptions and understanding between young Japanese and Spanish people, there is an age bias in the sample towards young people (57.5% aged between 18 and 24).

Regarding the recruitment at the university, two different means of advertisement were used: on the one hand, by means of posters on the notice boards and on the digital advertising screen at the entrance to the Faculty of Sciences and Technology (FST) and to the School of Engineering Bilbao (SEB) and,

on the other hand, via email sent by the department of the ITC (SEB), the Vice-Dean's Office for Communication and Social Outreach (FST), and the Sub-Directorate for Nautical Studies. On the beach, a convenient sampling method was used for the recruitment, and people who agreed to fill in the questionnaire entered directly via their mobile phone using a QR code.

2.2. Survey.

The survey was developed based on the one used in a similar study with Japanese university students (Shibata, 2024b), with additional modifications suggested by experts. The survey consists of 35 questions categorized into demographic questions, potential visit to Australian beaches, usual safety behaviour on Basque beaches and interpretations of beach safety signs used on Australian beaches. Most questions were closed questions with multiple responses; however, questions related to the interpretations of the terms, flags and iconography were open questions. In this way, providing a certain openness in the answers allows to note cultural and/or linguistic influence (Au, 2019; Pettersson, 1982). Open responses on the interpretation of the beach safety terms and signs were only given to those who knew or believed they knew the terms. The survey was conducted in Spanish, except for the beach safety terms, which were in English. A list of the survey questions translated into English is provided in Appendix.

To ensure the validity of the survey, the adaptation and clarity of the questionnaire were reviewed and validated by a researcher in the field of multilingualism education. In addition, the lifeguarding coordinator for Biscayne beaches reviewed the survey and provided some suggestions regarding suitability of the survey for the Basque beachgoers (Koon et al., 2023).

The survey was also reviewed and approved by a Commission on Ethics on Human Subjects Research (approval number M19/2023/372).

2.3. Analysis.

The responses of the survey were collected using Microsoft Forms 365.The descriptive analysis for quantitative data was conducted using both Microsoft Excel 2016 and IBM SPSS Statistics 27.0. Additionally, the data from participants under 24 years old were also extracted and analysed in order to make a comparison between Spanish and Japanese young adults (Shibata, 2024b). The deductive analysis for qualitative data was carried out using VBA macros in Microsoft Excel 2016. For coding the open responses to potential interpretations of beach safety terms and warning signs, similar or the same responses were categorized into a single code. Inconsistent or irrelevant responses to the question and others such as "I don't know" were coded as 'unsure'. All participants were over 18 years of age (the legal adulthood age in Spain). The quantitative analysis includes significance testing for differences between Basque and Japanese respondents, reporting p-values lower than 0.05.

3. Results.

3.1. Demographics.

More than half of the survey participants (59.9%) were male and only one person was of non-binary gender. Over half of participants (57.5% n=96) were university students aged between 18 and 24 years (Table 1). While 7.7% (n=13) of the participants reported that their English proficiency is lower intermediate or below (i.e. <B2) (Table 2), the majority (82%, n=138) have studied the English language for more than 6 years (Table 3). In relation to the location of residence, only one lives outside Spain (in Ecuador) and three have lived in another country for most of their lives (in Cuba, Ukraine, and Venezuela).

Table 1: Age and gender of participants.

	Total: n (%)	Male: n (%)	Female: n (%)	Non-binary: n (%)
18-24 years	96 (57.48%)	54 (32.34%)	41 (24.55%)	1 (0.6%)
25-34 years	32 (19.16%)	17 (10.18%)	15 (8.98%)	
35-44 years	11 (6.59%)	8 (4.79%)	3 (1.80%)	
45-54 years	19 (11.38%)	13 (7.78%)	6 (3.59%)	
55-64 years	9 (5.39%)	8 (4.79%)	1 (0.6%)	

Source: Authors.

Table 2: English proficiency.

CEFR (Cambridge scale)	n	%
Mother tongue	1	0.60%
> C1 (proficient level)	17	10.18%
C1 (advanced level)	69	41.32%
B2 (upper intermediate level)	67	40.12%
< B2	13	7.78%

Note: English level of the Common European Framework of Reference for Languages (CEFR) and Cambridge English Scale aligned to the CEFR.

Source: Authors.

Table 3: The length of studying English.

Time studying English	n	%
Mother tongue	1	0.60%
> 8 year	115	68.86%
6 – 8 years	23	13.77%
1 – 5 years	27	16.17%
< 1 year	1	0.60%

Source: Authors.

3.2. Expected experiences when visiting Australian beaches.

Only 9 (5.4%) of the participants previously visited Australia. Of those, 5 stayed for less than 3 months and the rest for less than one year. Regarding future visits to Australia, almost 95% (n=158) of participants said they would visit the beach in Australia and of those, 148 (94%) would enter the water.

3.3. Decisions on the choice of the safety swimming area.

There are a variety of factors that affect the choice of beach bathing site particularly lack of awareness, or convenience (e.g. a place close to their holiday accommodation, beach entry, a quieter location away from crowds) and/or social or behavioural reasons (Houser et al., 2017; Uebelhoer et al., 2022; Williamson et al., 2012).

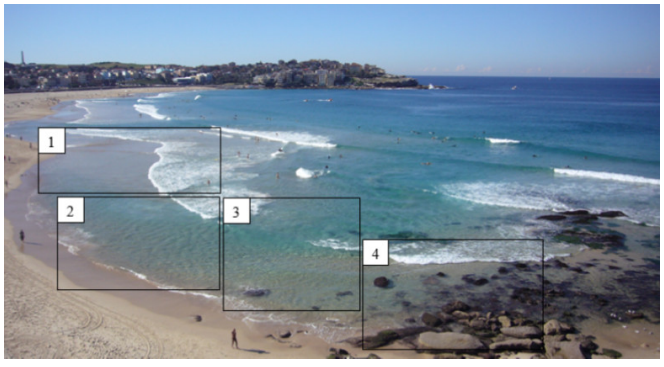
Figure 1 shows a picture of Bondi beach in Sydney, Australia, divided in four different areas: (1) a safe area with no currents and rocks, (2) a slightly cautious area with a side current merging into the main rip current, (3) unsafe area with the main rip current and (4) unsafe area due to the presence of reefs. The same picture was used in the previous investigation of Shibata (2024b). Participants were asked about the area where they would enter into the water to swim or bathe. Table 4 shows the decisions on swimming area options. About half chose the least dangerous area (Area 1), although about 35% (n=59) of participants would enter the feeding currents zone (Area 2).

Table 4: Decisions on swimming area options.

Area	Hazard	Number & percentage			
		All respondents		Aged between 18-24	
		n	%	n	%
Area 1	No hazard	76	45.51	39	40.63
Area 2	Feeding currents	59	35.33	43	44.79
Area 3	Main rip current	25	14.97	12	12.50
Area 4	Rocks	4	2.40	2	2.08
No entry		3	1.80	0	0

Source: Authors.

Figure 1: Bondi beach.



Source: Authors.

3.4. Interpretations of beach safety signage used in Australia.

This section describes the perceptions of the red and yellow safety flags, and the signage terms and iconography. The format of the questionnaire in this section obliges the participant to specify an open answer if he/she responds affirmatively to the question.

3.5. Interpretations of red-yellow flags.

It is noted that the red and yellow flags are not used on the beaches where participants were recruited. To provide a contextual background, the survey included a photograph of an Australian beach where these flags were displayed. First, participants were asked if they knew the meaning of these flags and then had to choose between several answers. Table 6 shows the responses broken down into two groups: all participants and by all young adults. 47 (28%) participants answered that they knew the meaning of these flags while about 3 in 4 (n=120, 72%) did not know the flags. However, of those who "knew" the meaning less than half (n=21, 45%) knew the actual meaning of the safety flags – i.e. a safe zone for bathing and wading except for surfing. Almost half of them (n=21, 45%) responded that it was an exclusive area for surfing and 4 (0.9%) responded that it was a safe area also for surfers. Only one person (0.2%) chose the 'private area' response. For university students aged 18-24, 25 out of 96 (25%) responded that they knew the meaning of the flags, but 11 out of the 25 (44%) answered wrongly that it was a dangerous area where the surf is permitted, and only 10 (40%) answered correctly. According to the results, no significance difference was found between two groups.

However, if these results are compared with those obtained by Shibata (2024b), there is a statistically significant difference between Basque participants and Japanese students, as Basques associate red-yellow flags with a surfing area (X^2=39.587, p <0.001) and Japanese students with an area where all activity is prohibited (X^2=42.949, p<0.001).

Table 5: Interpretation of red & yellow flags.

	All participants		18-24 years old	
	n	%	n	%
Do you know the meaning of these flags (red & yellow flags) on the frontline of the beach?				
Safe Zone (Swimming, wading, and playing are OK, but not surfing)	40	24.0%	17	17.7%
Safe Zone (Swimming, wading, playing, and surfing are OK)	6	3.6%	5	5.2%
Danger Zone (Swimming, playing, and surfing are prohibited)	23	13.8%	14	14.6%
Danger Zone (Swimming and playing are prohibited, but surfing is OK)	76	45.5%	43	44.8%
Racing Zone (any aquatic competition is taking place)	17	10.2%	13	13.5%
Private Zone	5	3.0%	4	4.2%

Source: Authors.

3.6. Interpretations of terms used on beach safety signage.

The questionnaire asked participants if they knew the meaning of various terms used on beach safety signage. If the answer is yes, with absolute certainty or with some doubt, then the participant were requested to clarify their understanding with textual responses. The statistical result is presented in Table 7, broken down into two groups (all participants and young people), and the result from the code analysis of textual responses is presented in Table 8. There are hardly any significant differences between the two groups, but a lower degree of confidence

is observed among young people when answering (e.g. absolute certainty when answering the question related to 'shore break', $?^2$=4.113, p=0.04). The results show that less than half of the participants know or think they know the meaning of beach safety terms, except "submerged objects" where it slightly exceeds 50% and the majority (45%) respond with a correct answer. This degree of certainty in the term "submerged objects" seems logical considering that the term is spelled almost identically in English and Spanish, and the two words that compose it have the same meaning in both languages. Regarding "bluebottle" and "shore dump", translated into Spanish as *carabela portuguesa* ("bluebottle") and *orillera* ("shore dump"), only 2.4% and 4.2% of the participants respectively know exactly what they mean. Although most participants may know the meaning of each word, they do not know the meaning of the words together as a warning message. On the other hand, 15% (n=25) of the participants were familiar with the meaning of the term "shore break", as the English translation of both terms implies that it is something that breaks on the shore. However, 10.8% (n=18) of the respondents associated it with breaking waves. In relation to the term "high surf", identical percentage of participants (12.6%) interpret this term as high waves or as surfing the wave. One participant even commented, "this term does not exist in the surfing world". Regarding "rip currents", 13.7% of all participants knew the correct meaning as seaward current, although a higher number of participants (n=36, 21.6%) referred it to another type of current such as tidal stream, or unspecified currents such as dangerous current. As for the Spanish equivalent word of rip currents, "*resaca*", which in Spanish has diverse and varied meanings that can confuse participants, 54.5% (n=91) of all participants knew the correct meaning (seaward current), while 13.2% (n=22) referred it to another type of current (dangerous current, tidal stream or suction of the water) and 32.3% (n=54) did not know this term or interpreted it as an irrelevant meaning. It is particularly interesting that nine participants associated the term with a hangover in the context of beach safety, which leads us to believe that they were giving a humorous response.

Taking into account the results of Shibata (2024b), statistically significant differences were observed in the understanding of terms "high surf" and "shore dump" between Japanese university students and Basques, p<0.0003.

Regarding the participants' overestimation of their knowledge of beach safety terms, table 8 shows the percentage of correct answers of those participants who are sure or fairly sure with their knowledge of the beach safety terms. These results are broken down into young adults (under 24 years of age) and the total number of participants, and no significant differences were found.

3.7. Interpretations of graphic icons used on beach safety signage.

Table 9 shows how participants interpreted the symbols used on Australia's beach safety signage. Although most participants correctly interpreted the pictorial information about 'high waves' (63.4%), some thought that the person in the picture was standing on the sand and misinterpreted it as a warning about breaking waves on the shore (5.4%). 35.3% (n=59) interpreted the pictorial information of the "dangerous currents" correctly, including some responses referring to rip current (n=7, 4.2%). Despite the fact that only 14.4% (n=24) recognised the icon of "bluebottle", 65% (n=85) interpreted the icon as some type of jellyfish. In the case of the icon of "submerged objects", 116

Table 6: Quantitative results regarding knowledge on the Australian beach safety terms.

	All participants n (%)	18-24 years old n (%)
Do you know the meaning of "high surf"?		
Yes, absolutely	13 (7.8%)	3 (3.1%)
I know both words, and I think I understood, but I'm not entirely sure	34 (20.4%)	13 (13.5%)
I don't know either word, so I don't know what it means	13 (7.8%)	12 (12.5%)
I know both words, but I don't understand what they mean together	107 (64.1%)	68 (70.8%)
Do you know the meaning of "bluebottle"?		
Yes, absolutely	9 (5.4%)	3 (3.1%)
I know both words, and I think I understood, but I'm not entirely sure	11 (6.6%)	3 (3.1%)
I don't know either word, so I don't know what it means	30 (18.0%)	21 (21.9%)
I know both words, but I don't understand what they mean together	117 (70.1%)	69 (71.9%)
Do you know the meaning of "submerged objects"?		
Yes, absolutely	45 (26.9%)	19 (19.8%)
I know both words, and I think I understood, but I'm not entirely sure	46 (27.5%)	26 (27.1%)
I don't know either word, so I don't know what it means	11 (6.6%)	9 (9.4%)
I know both words, but I don't understand what they mean together	65 (38.9%)	42 (43.8%)
Do you know the meaning of "shore dump"?		
Yes, absolutely	10 (6.0%)	3 (3.1%)
I know both words, and I think I understood, but I'm not entirely sure	19 (11.4%)	9 (9.4%)
I don't know either word, so I don't know what it means	53 (31.7%)	31 (32.3%)
I know both words, but I don't understand what they mean together	85 (50.9%)	53 (55.2%)
Do you know the meaning of "shore break"?		
Yes, absolutely	29 (17.4%)	8 (8.3%)
I know both words, and I think I understood, but I'm not entirely sure	19 (11.4%)	10 (10.4%)
I don't know either word, so I don't know what it means	36 (21.6%)	24 (25%)
I know both words, but I don't understand what they mean together	83 (49.7%)	54 (56.3%)
Do you know the meaning of "rip currents"?		
Yes, absolutely	38 (22.8%)	16 (16.7%)
I know both words, and I think I understood, but I'm not entirely sure	25 (15.0%)	16 (16.7%)
I don't know either word, so I don't know what it means	26 (15.6%)	17 (17.7%)
I know both words, but I don't understand what they mean together	78 (46.7%)	47 (49%)
Do you know the meaning of "resaca"?		
Yes, absolutely	106 (63.5%)	49 (51%)
I know both words, and I think I understood, but I'm not entirely sure	36 (21.6%)	27 (28%)
I don't know either word, so I don't know what it means	9 (5.4%)	5 (5.2%)
I know both words, but I don't understand what they mean together	16 (9.6%)	15 (15.6%)

Source: Authors.

Table 7: Qualitative results regarding knowledge on the Australian beach safety terms.

Question (n = number of participants who say they know or think they know what it means)	**Descriptions**
Do you know "high surf" means? (n = 47)	high waves (21), area for experienced surfers (11), surfing area (8), unsure (4), this term does not exist in the surfing world (1), surfing competition (1), high waves and rip current (1)
Do you know "bluebottle" means? (n = 20)	a type of jellyfish (6), jellyfish (4), bluebottle (4), calm water for bathing (1), a type of fly (1), organisms in the water (1), boat area (1), blue bottle (1), unsure (1)
Do you know "submerged objects" means? (n = 91)	submerged objects (82), non-visible underwater objects (5), unsure (3), objects buries in sand (1)
Do you know "shore dump" means? (n = 29)	dump/litter on the shore/waves bringing litter/contamination (17), waves breaking on shore (7), unsure (1), shallow water (1), breaking waves (1), coastal depression (1), current towards the shore (1)
Do you know "shore break" means? (n =48)	waves breaking on shore (25), breaking waves (18), breakwater (2), unsure (2), area with no currents (1)
Do you know "rip current" means? (n = 63)	dangerous current (36), rip current (23), waves/rough sea (1), unsure (3)
Do you know "resaca" means? (n = 142)	rip current (91), dangerous current (19), waves/rough sea (14), hangover (9), unsure (6), current towards the bottom (2), tidal stream (1)

Source: Authors.

Table 8: Percentage of correct answers of those participants who clarified their interpretations in open questions.

	All participants % (n1/n2)	18-24 years old % (n1/n2)
Do you know the meaning of "high surf"?		
Yes, absolutely	85% (11/13)	100% (3/3)
I think I understood	32% (11/34)	23% (3/13)
Do you know the meaning of "bluebottle"?		
Yes, absolutely	22% (2/9)	67% (2/3)
I think I understood	18% (2/11)	33% (1/3)
Do you know the meaning of "submerged objects"?		
Yes, absolutely	89% (40/45)	84% (16/19)
I think I understood	91% (42/46)	92% (24/26)
Do you know the meaning of "shore dump"?		
Yes, absolutely	30% (3/10)	33% (1/3)
I think I understood	21% (4/19)	22% (2/9)
Do you know the meaning of "shore break"?		
Yes, absolutely	89% (17/29)	75% (6/8)
I think I understood	42% (8/19)	50% (5/10)
Do you know the meaning of "rip currents"?		
Yes, absolutely	34% (13/38)	44% (7/16)
I think I understood	40% (10/25)	37% (6/16)
Do you know the meaning of "resaca"?		
Yes, absolutely	70% (71/106)	61% (30/49)
I think I understood	56% (20/36)	52% (14/27)

Note: n1 = Number of correct answers / n2 = Number of those participants who are sure or think they know the meaning of beach safety term

Source: Authors.

participants (69%) indicated that they understood them, and responses varied into "do not jump into the water" (n=52, 31%), "shallow water" (n=32, 19%), and "submerged objects" (n=17, 10%). The most unclear sign for the participants appears to be "slippery area" where only 55 respondents (33%) thought they knew its meaning and only 6 respondents (4%) answered correctly.

When comparing these results with those obtained by Shibata (2024b), a statistically significant difference was observed in the perception of icons of bluebottle and submerged objects by Basque and Japanese groups, $p<0.00015$. 98% of Basque participants who claim to know the answer associate the bluebottle icon with a type of jellyfish, compared to only 54% of responses from the Japanese group. On the other hand, 36% of Japanese group responses regarding the submerged objects icon were correct, compared to only 17% of Basque participants who thought they knew its meaning but instead associated it with a prohibition on jumping into the water.

4. Discussion.

As a general issue regarding the beach safety signage, many open-ended responses were found erroneous even though the participant believes he/she knows what is being asked. This shows that participants overestimate their knowledge of beach safety signage and misunderstand its meaning without any doubt.

Table 9: Interpretations of icons used on beach safety signage.

Question n = number of affirmative (I know/I think I know) responses	Descriptions
What do you think this sign (slippery area) means? (n = 55)	risk of falling into the water (23), risk of fall (17), slippery area (6), jumping into the water is not allowed (2), risk of drowning (1), submerged objects (1), risk of being swept away by waves (1), unsure (1), shifting sands (1), quicksand (1), landslide (1)
What do you think this sign (submerged objects) means? (n = 116)	risk of hitting the seabed when jumping into the water (42), shallow waters (32), submerged objects (17), do not jump into the water (11), risk of hitting the seabed (9), dangerous bottom (3), unsure (1), dangerous rocks on the sea surface (1)
What do you think this sign (high surf) means? (n = 119)	high surf (106), shore break (9), unsure (1), breakwater (1), dangerous surfing area (1), risk of drowning (1)
What do you think this sign (dangerous currents) means? (n = 69)	dangerous current (52), rip current (7), lateral current (3), risk of drowning (2), no swimming seaward (1), warning not to touch the seabed (1), do not swim far from bathing area (1), unsure (1), dangerous bathing (1)
What do you think this sign (bluebottles) means? (n = 111)	jellyfish (85), bluebottle (24), do not swim (1), high surf (1)

Source: Authors.

4.1. Beachgoers' decisions on the choice of the safety swimming area.

In relation to the selection of the safe swimming place, 15% of survey respondents (12.5% of 18-24 aged) would choose the area where the main rip current is located. This result shows that beachgoers surveyed on Basque beaches are more likely to choose the area with rip currents than young Japanese visitors (Shibata, et al., 2024b). This result also shows that young adult beachgoers on Basque are more likely to avoid rip currents compared to 307 studied in Sotés (2018). It should be noted that Sotés (2018) used two photographs with more explicit colour contrast between the scum and calm area, and without shallow water and reefs, so the difference in the result between this study and Sotés (2018) may be caused by the different clarity of the pictures.

4.2. Interpretation of red-yellow flags.

Regarding red-yellow flags, only 24% of the participants (10.2% of 18-24 aged) interpret that they delimit a safe bathing area where surfing is not allowed. This percentage is in line with the interpretation of Japanese university students, however, the majority of those surveyed in the Basque Country (45%) think that these flags delimit an exclusive area for surfing, while only 13.2% of Japanese university students think the same way (Shibata, 2024b). This tendency can be expected to some extent, since different flag systems, which does not align with ILS standards, are used in the Basque Country to make a physical distribution of the water area, delimiting an exclusive area for surfing and not for swimming (Basterretxea-Iribar, 2022). Despite the low percentages in both studies, these results appear to be positive when compared to a recent survey in the Netherlands where only 3.4% knew the correct meaning of red-yellow

flags (Roefs et al., 2023). In the other hand, international students studying in Australia have a slightly better understanding of the meaning of red-yellow flags, with 31% interpreting them correctly (Shibata, 2024a). However, these results appear to be positive when compared.

4.3. Interpretation and perceptions of terms and icons on the signs.

Some beach security terms are difficult to translate into other languages. For example, the National Weather Service (NWS) has recently developed rip current divulgation tools translated into Spanish, which were tested among members of the Spanish-speaking community in New York City area (Bernhardt, 2024). The study of Bernhardt (2024) found that both the English and Spanish brochures regarding beach safety were generally effective for communicating risk; however, the Spanish version had some translation issues of scientific terms and phrases, some of which have been found in the present investigation, such as the Spanish term "*resaca*", which is translated as hangover (unpleasant physical and mental symptoms caused by drinking alcohol) in both investigations. There seem to be translation issues when translating Australian beach safety terms into Spanish. For instance, the English word "surf" is defined in the Spanish Dictionary as "*deporte náutico consistente en mantenerse en equilibrio encima de una tabla especial que se desplaza sobre la cresta de las olas*" (RAE, 2025), which, in a back translation, means "water sport consisting of balancing on a special board that moves along the crest of the waves" in English. Because of this, the present study shows that the Basques beachgoers associate the word *surf* more with a sport than with waves, while the Japanese associate it with waves, according to research carried out by Shibata (2024a). This translation issue of "surf" was also found in Chinese and Japanese (Shibata et al., 2024a), implying that understanding the signage term has nothing to do with linguistic knowledge, but rather with cultural differences. Regarding "bluebottle" and "shore dump", Basque beachgoers do not know the meaning of the words together as a warning message, although most of them may know the meaning of each word. The term, "shore dump" does not appear in English-Spanish dictionaries, but as a sole word, "dump" is defined as "an uncontrolled area where solid wastes have been left on or in the ground" (Oxford, 2025a). The term, "bluebottle" is defined as "a common blowfly with a metallic blue body" and, further explained that only Australia and South Africa refer it as "the Portuguese man-of-war" (Oxford, 2025b). The Portuguese man-of-war can be translated into Spanish as *carabela portuguesa*, which is more commonly used than bluebottle in Spain (Martínez et al., 2010). The bluebottle inhabits tropical waters but, due to overfishing and climate change, it has become more frequent in the coasts of the Bay of Biscay and the Basque Country, and even in the Mediterranean (Ferrer et al., 2013; Martínez, 2010; Badalamenti, 2021), which has led many Basque participants to recognise its icon. The term "bluebottle" is a localism that can be misleading for foreign tourists, even if they know English. Therefore, in order to accommodate local and foreign visitors like ones from Basque, the term "bluebottle" needs to be accompanied with an alternative, "Portuguese man-of-war".

As for the term *submerged objects*, almost half of the Basque beachgoers knew its meaning while no Japanese knew it with certainty in the research carried out by Shibata et al. (2024b). This degree of certainty of the Basques in the term "submerged objects" seems logical if one takes into account that the term is spelled almost identically in English and Spanish, and that the two words that compose it have the same meaning in both languages. In the case of Japanese, almost 30% of young adults knew the meaning of each separate word, but almost none understood the meaning of the whole term (Shibata, et al, 2024b). This finding shows different linguistic perceptions of the beach signs between both nationality groups. Paradoxically, the Japanese identify the icons of submerged objects better than the Basques, who associate them with prohibitions on jumping into the water from piers or rocks, demonstrating cultural differences between the two groups.

In the case of the rip current, 91 participants (54%) defined it as a seaward current, but only 44 of them (48%) would choose the safest place to bathe away from currents. Therefore, it is not enough to know what rip currents are, but it is necessary to identify them on the beach. These results in the Basque Country are in line with other studies showing a lack of ability to identify a rip current (Brannstrom et al., 2015; Caldwell et al., 2013; Sherker et al., 2010).

4.4. Aquatic safety education in Spain.

In 2017, 481 drowning deaths was recorded in Spain. Over half of those occurred on the beach (RFESS, 2017). In 2024, this figure has not changed much, as 244 out of 471 drowning deaths recorded in 2024 occurred on beaches (RFESS, 2024). In the same way, the results of this study do not show that there has been a clear improvement in the choice of a safe swimming area by Basque university students compared to 8 years ago, in addition to showing a lack of knowledge of the meaning of the signage used by the ILS.

A national safety plan for drowning prevention has been demanded for a long period of time in Spain. On 20 September 2017, a non-legislative proposal "Regarding the preparation of a national plan for Aquatic Rescue and Lifesaving" was presented in the Committee on Agriculture, Food and the Environment. It was approved unanimously by the committee and the Spanish Government was urged to prepare this plan within 6 months (Cortes Generales, 2017). The problem lies in outdated legislation (Orden, 1972), and a decentralisation of the management of the beaches, giving this competence to the municipalities under the terms provided by the legislation issued by the Autonomous Communities (Ley de Costas, 1988). Compared to other sectors, positive results were observed in road traffic fatalities in Spain due to a strong impact of regulatory policies (Villalbí et al., 2006). In addition, the impact of hard-hitting road safety advertisements in TV, radio, newspaper, or any other means of communication show a reduction in the number of deaths and injuries in serious traffic accidents (Castillo-Manzano et al., 2012). The effectiveness of these traffic campaigns is substantially increased if they are accompanied

by other preventive measures such as legislation or road safety education (Faus et al., 2021). Considering that the risk of death from exposure to drowning is 200 times higher than road traffic accidents (Mitchell et al., 2010), it would be advisable to establish a safety regulation, provide better education, and use provoking advertisements in order to reduce coastal drownings in Spain.

Reinforce the value of school-based training also provides a general foundation for aquatic safety (Wilks, 2017). Seminars in primary and secondary schools can educate the population at an early age on the aquatic safety. This is much needed, considering that 86% of drownings in 2024 occurred on beaches where no lifeguarding services (RFESS, 2024); hence, establishing coastal safety knowledge is a primary strategy for drowning prevention.

4.5. Limitations.

The recruitment of participants was focused on age-related imbalances giving preference to a young age range and so, a major number of university respondents were selected. Because it was voluntary for university students to participate in the survey, some may have felt obliged to do so and quickly responded with some simple options such as "I do not know". These measurement errors were eliminated in this way. Given that the online survey used English beach safety terms, some participants may have considered using online dictionaries. In fact, one respondent gave the incorrect Google translation for "bluebottle" referring to a type of fly, or another one gave the incorrect DeepL translation "*surf de altura*" for "high surf", what demonstrates that these tools may have been used by participants. However, both Google and DeepL translator only give a correct translation into Spanish for "submerged objects" and "rip current" terms. In addition, it would be possible that the respondents have been able to use Google or other web search engine to respond other questions related to beach safety symbols.

The participant pool (169 respondents, 57.5% aged 18-24, mostly university students) is skewed toward younger, educated individuals, potentially limiting the applicability of findings to broader Basque populations (e.g. groups of young people who are not university students and have a lower level of English language proficiency).

The study lacks broader European context beyond a mention of the Netherlands (Roefs et al., 2023). Future studies including perspectives from other countries using similar flag systems (e.g., UK, Ireland) would strengthen the argument for international standardization.

Conclusions.

This research shows a lack of understanding of Australian beach safety signs among Basque university students and beachgoers. More than half of the participants thought that the red-yellow flags signify an area reserved for water sports rather than for a safety bathing area. This finding calls for international standardisation of beach safety signs. Likewise, localisms specific to each country also accentuate this lack of knowledge of the safety terms used on beaches, which requires improvement and revision to adapt them to the overseas-born beachgoers. In addition, the way terminology and symbolism are interpreted differs from country to country, reflecting cultural perceptions and understanding of Australian beach signs. Specific design schemes (e.g., layout of multilingual signage, standardization of symbol systems) would be recommendable. Since this study shows very limited knowledge of the coastal safety among students and beachgoers in Basques, safety education especially at an early age should be provided in order to prevent them from drowning. Likewise, there is an overestimation by Basque beachgoers of the knowledge of beach safety signage and warnings, which requires insisting on aquatic education. The key elements for conducting beach safety would be based on mechanisms for identifying and assessing beach hazards and evaluating the swimmer's own limitations.

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Appendix.

Demographics:

Q1. Which country do you currently live in?

Q2. Which country were you born in?

Q3. Which country have you lived in for the longest amount of time?

Q4. What gender do you identify yourself as?

Q5. How old are you?

Q6. How many years have you studied English?

Q7. How well do you understand English?

Q8. Have you been to Australia before?

Q9. If yes, how long have you stayed in Australia?

Q10. If/when you go to Australia, do you intend to go to the beach?

Q11. Do you intend to go into the water at the beach?

Q12. What purpose do you usually go to the beach for?

Q13. Where would you enter the water to swim or bathe at this beach?

Q14. If you went to/have visited a beach in Australia, did you read the public safety signage? (a question to only those who visited Australia)

Q15. Have you learned anything about beach safety in Australia? (A question to only those who visited Australia)

Behaviour on the beach in your country:

Q16. Who did you learn beach safety information from?

Q17. When you go to a beach in your country, how often do you read the public safety signage?

Q18. How do you decide where to swim at a beach?

Q19. How often do you use inflatable toys when you go to the beach?

Q20. How often do you wear clothes (e.g. T-shirt) in the water when you go to the beach (the clothes do NOT include wetsuits, swim bathers, rash, and lycra)?

Interpretation and perceptions of Australian beach safety terms:

Q21. Do you know "high surf" means?

Q22. If you know or think to know the term "high surf", please specify what it means.

Q23. Do you know "bluebottle" means?

Q24. If you know or think to know the term "bluebottle", please specify what it means.

Q25. Do you know "submerged objects" means?

Q26. If you know or think to know the term "submerged objects", please specify what it means.

Q27. Do you know "shore dump" means?

Q28. If you know or think to know the term "shore dump", please specify what it means.

Q29. Do you know "shore break" means?

Q30. If you know or think to know the term "shore break", please specify what it means.

Q31. Do you know "rip currents" means?

Q32. If you know or think to know the term "rip current", please specify what it means.

Q33. Do you know what "*resaca*" means?

Q34. If you know or think to know the term "resaca", please specify what it means.

Interpretation and perceptions of Australian beach safety signs (flags and iconology):

Q35. Have you learned what the Australian red and yellow flags mean?

Q36. What do you think these flags mean? Or what were you told about these flags?

Q37. Do you understand the warning message of this sign? (a picture of the slippery area icon without text)

Q38. If yes, please explain what this signage means?

Q39. Do you understand the warning message of this sign? (a picture of the submerged objects icon without text)

Q40. If yes, please explain what this signage means?

Q41. Do you understand the warning message of this sign? (a picture of the high surf icon without text)

Q42. If yes, please explain what this signage means?

Q43. Do you understand the warning message of this sign? (a picture of the dangerous current icon without text)

Q44. If yes, please explain what this signage means?

Q45. Do you understand the warning message of this sign? (a picture of bluebottle without text)

Q46. If yes, please explain what this signage means?

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