

# Harmonising waste labels on products and waste receptacles to guide citizen waste sorting

An assessment of the impact of simple and intuitive waste labels on EU citizens waste sorting.

April 2024

April 2024.

EUpicto

Brancheforeningen Cirkulær - Circular Denmark – [www.cirkulaer.dk](http://www.cirkulaer.dk)

Avfall Sverige - Swedish Waste Management - [www.avfallsverige.se](http://www.avfallsverige.se)

Samband íslenskra sveitarfélaga - Icelandic Association of Local Authorities -

[www.samband.is](http://www.samband.is) KIVO Suomen Kiertovoima - Finnish Solid Waste Association -

[www.kivo.fi](http://www.kivo.fi)

Author:

Sofie Martine Dideriksen, bro Kommunikation A/S.

# Content

<b>Background and introduction</b>	<b>4</b>	
Policy context		4
Central arguments		4
<b>Bounded rationality and waste labels as in-the-moment cues</b>	<b>5</b>	
Problem driver		5
EU citizens as bounded rational		5
<b>Keep it simple – the Nordic Pictogram System as a role model</b>	<b>6</b>	
The Nordic Pictogram System		6
Simplicity for focused attention and low cognitive effort		6
Colours for attention and automatic categorisation		7
User experiences with the Nordic waste pictograms		8
<b>Make it intuitive – matching labels on products and waste receptacles</b>	<b>9</b>	
Waste labels as informative cues		9
Waste labels as normative cues		10
Social norms on waste sorting		11
<b>Appendix A: Eye tracking study comparing waste signs and symbols</b>	<b>12</b>	
<b>Appendix B: Waste pictograms from the Danish study on reaction time</b>	<b>15</b>	
<b>Appendix C: Pictogram signs from the Danish study on waste signs</b>	<b>16</b>	
<b>Appendix D: Waste pictograms from the Swedish study on waste signs</b>	<b>17</b>	
<b>References</b>	<b>18</b>	

# Background and introduction

## Policy context

This document contributes to the debate on labelling packaging waste that is taking place as the EU is revising its rules in the Packaging and Packaging Waste Directive (PPWD). More specifically, this document serves as input to the legislative proposal of the EU Commission to set requirements for packaging labelling in the EU.

As described in a recent report by the Joint Research Centre (JRC), the current rate of recycled Municipal Solid Waste (MSW) is lower than desired in the EU and Separate Waste Collection (SWC) has been identified as a positive driver of increased and higher quality recycling (Albizzati et al., 2023). To improve SWC, households and businesses must improve their waste sorting. For this reason, it is important to ensure that sorting waste is easy and accessible for EU citizens in their everyday life. Not only for the dedicated and well informed citizens, but also for the average citizen, for whom sorting waste is competing with other daily tasks.

Backed up by behavioural science and several studies on citizen's waste sorting, we argue that waste labels must be simple, salient, and intuitive for EU citizens to notice, understand and act upon them in their everyday life, where many things are competing for their attention. In other words, waste labels should enable waste sorting without much cognitive or behavioural effort.

## Central arguments

In this document, we begin by describing the potential of harmonising waste icons in the EU, from a behavioural science perspective. We describe how labels can help and guide the average EU citizen to better waste sorting from the behavioural science perspective of the bounded rationality of humans. Based on this starting point, we end up with two main arguments:

1. The labels should be kept simple – following the Nordic Pictogram System as a role model (p. 6)
2. The labels should be intuitive – arguing for matching labels on products and waste receptacles (p. 9)

Even though harmonisation of waste labels has already been carried out in the Nordic countries, it is difficult to document the effect, as it has been carried out alongside many other actions on SWC. However, in this document, we emphasize the likelihood that simple and harmonised waste labels will have a positive impact on citizens' waste sorting behaviour.

# Bounded rationality and waste labels as in-the-moment cues

## Problem driver

Evidence shows that one of the problem drivers behind the low rates of recycled MSW in the EU, is a considerable level of confusion among citizens on how to sort their waste (Albizzati et al., 2023). This is partly due to differences in waste communication because incorrect and heterogenous colours and shapes of waste receptacles discourage citizen engagement, leading to lower recycling rates (Tonglet et al., 2004).

To assist citizen waste sorting, Member States have been implementing various waste schemes, including labelling on product packaging and waste receptacles. This however, leads to “a multiplication of labels to be displayed in different jurisdictions, increasing costs for producers, and increasing the risk of confusion for consumers” (Albizzati et al., 2023, p. 1).

In a 2023 JRC report, the authors found that the literature generally connects labelling with positive impacts on waste sorting as well as on SWC rates and quality (Albizzati et al., 2023). For this reason, we argue that waste labels can have an important and positive impact on waste sorting behaviour. To understand why, we must first understand the premise of human behaviour.

## EU citizens as rationally bound human

With the rise of experimental behavioural science, it has been clear that human rationality is far from perfect. Instead, humans are bounded rationally, meaning that our rationality is limited by the cognitive capability of the mind – attention span, information processing, memory etc. – as well as the time available or taken to decide what to do. The decision depends greatly on the in-the-moment perceived outcome of the behaviour, which in turn is influenced by the context and the information at hand. (Kahneman, 2011; Thaler & Sunstein, 2021).

For this reason, we economise with our mental energy, which makes us more perceptive of intuitive cues or information and more inclined to perform less energy consuming behaviours (Kahneman, 2011; Thaler & Sunstein, 2021). Consequently, as waste sorting is seldomly prioritised in everyday life, EU citizens choose the easiest most accessible way to dispose of their waste.

One of the issues with citizens' waste sorting is that guidelines might not be remembered or at hand in the very moment of sorting waste or waste disposing (Albizzati et al., 2023). Knowing and retrieving information on how to sort every piece of waste you might end up with can be a cognitive challenging task – even more with different waste sorting rules within and across countries. For this reason, contextual cues and prompts are a great help for citizens. Waste labels can function as these in-the-moment cues offering both reminders and information on how to sort waste correctly.

To sum up, the more intuitive waste sorting is, the less energy consuming it will be, and the more people will do it. In addition, the easier it is to remember how to waste sort correctly, the easier it will be, and the more people will do it. And the more perceptually salient waste sorting is, the more people will remember to do it. For this reason, placing intuitive waste symbols on product packaging and waste receptacles could be an effective way of assisting waste sorting. We will elaborate the reasoning behind this conclusion in the following pages

# Keep it simple – the Nordic pictogram system as a role model

Waste labels on product packaging – and possibly waste receptacles – can serve as a *reminder* of waste sorting by catching attention and interrupting existing habits. For this to happen, they must be salient (to be easily noticed and recognised) and simple (to be easily understood) (Cristóbal et al., 2022). Consequently, the design of the labels is important, and a well-designed pictogram system is expected to have an overall positive influence on citizens' sorting behaviour (Cristóbal et al., 2022). Symbols and colours are key factors in this regard as they offer clarity (Avfall Sverige, 2023).

For this reason, we argue that the Nordic pictograms can serve as a role model for labels in EU Member States.

## The Nordic Pictogram System

The Nordic pictograms, used in Denmark, Sweden, Norway, Iceland, the Faroe Islands, Estonia, Latvia, and Lithuania, consists of three elements for each waste fraction: a simple symbol, a one-word fraction name and a colour. The pictograms were launched in Denmark in 2017 with the aim of ensuring a harmonised waste communication for citizens regardless of their location – where they live, work, or travel. The vision was to develop a system to guide waste sorting behaviour using intuitive and easy to read symbols. This vision has resulted in harmonised waste pictograms designed for households, businesses and recycling centres supported by a colour system and a fraction name in local language or English. (Circular Denmark, 2022a & 2022b; KL, 2015).

The pictograms are used on waste receptacles, product packaging, and sometimes on in-house waste receptacles in households. The latter happens because some municipalities have distributed the pictograms as stickers to private households – and because the pictograms are available to download online (City of Copenhagen, 2023a). This means that Nordic citizens are met with the same waste pictograms across different platforms, making it easier for them to understand, read, and intuitively follow the guidelines of the pictograms.

The mere exposure of the pictograms makes it easier for Nordic citizens to read them. This is due to the mere exposure effect which is the tendency to develop preferences for things as a mere effect of familiarity (Zajonc, 2001). The more often citizens are exposed to a certain stimulus – such as a waste pictogram – the easier it is for them to process it and the more they like it. In fact, studies show that repeated exposure confirms a positive effect in autobiographical memory and perceptual learning (Jacoby & Dallas, 1981; Reber et al., 1998; Winkielman & Cacioppo, 2001). In other words, repeated exposure increases perceptual fluency. This means that using the same pictograms across different countries, product packaging and waste receptacles, makes it easier for people to perceive and understand the pictograms without much cognitive effort.

## Simplicity for focused attention and low cognitive effort

The symbols in the Nordic Pictogram System are not icons, but pictograms defined as being simpler than icons. This simple visual style has been chosen as it can be processed with cognitive ease, making it easy for citizens to read them (KL, 2015).

Using AI eye tracking technology to compare the perception of the Nordic pictogram for paper waste with earlier, more detailed Danish pictograms for paper and cardboard, we find that the Nordic pictogram is better at focusing attention and has a lower cognitive

demand (see Appendix A). In other words, citizens will more quickly and easily register and process the Nordic pictogram, as opposed to the more detailed pictograms used earlier. This happens because of the pictogram's simplicity in style.

In a Danish study on the influence of waste symbols on waste sorting reaction time, different complexity levels were tested in a survey experiment with more than 1600 participants (Ministry of the Environment and Food, 2019). In the experiment, participants were asked to choose the correct waste fraction to dispose of different waste objects. The participants were randomly divided into three treatment groups to whom the fraction options were presented by either a) the Nordic pictogram alone, b) the pictogram supplemented by a photo of the fraction waste, or c) the pictogram, photo and a short text with relevant waste and recycling information (see Appendix B).

The study showed, not surprisingly, that the more information the participants were given, the longer the task would take. The reaction time did not significantly differ when photos were added to the pictogram, but when text was added, participants on average spent 60 seconds longer deciding where to dispose of the waste item. This happened even though the quality of the waste sorting did not change significantly. The insignificant difference even showed a lower waste sorting quality when text was added to the symbol (Ministry of the Environment and Food, 2019). These results show that more information on waste symbols lowers the reaction time of waste sorting without improving the quality.

The downside of the simplicity is that the Nordic pictogram is not very informative. It does not inform citizens of the waste types included and excluded in a waste fraction, and it does not inform citizens on how to prepare recyclable waste (clean, folded, etc.). To fully understand how to sort their waste, citizens must be informed of this elsewhere. The solution, however, is not to include more information on the waste labels, as this will increase the complexity level and in turn lower perception focus and heighten cognitive demand. Furthermore, other obstacles arise when trying to include more information on waste labels, including misunderstanding negation sentences (KL, 2015). In general, a lot of misunderstanding can happen when more text and complexity is added to labels that will be examined in a few seconds by citizens.

This conclusion is supported by a UK consumer survey on the OPRL recycling labels (OPRL, 2023). In this survey, one key finding is that clarity and consistency prevent confusion including that consumers prefer "clear and recognisable information at a glance" (OPRL, 2023, p. 6). OPRL finds that "most people want a quick prompt as they decide which bin to put packaging in. They don't want to stop to think about it, they're looking for a strong visual cue (...)" (OPRL, 2023, p. 6). Another key finding is that consumers are likely to follow simple label instructions that require less effort and ignore label instructions they do not understand (OPRL, 2023).

For these reasons, the main goal of the Nordic waste pictogram is not to inform, but to remind citizens to sort their waste and to intuitively guide their behaviour. To keep the labels simple and intuitive, supplementary information on waste sorting should be given to citizens at other times when they are more receptive of more cognitive demanding information as suggested by Albizzati et al. (2023).

### Colours for attention and automatic categorisation

For the labels to work as *reminders*, they must be perceptually salient. In general, humans tend to focus on attributes that are different from those of their surroundings, like a yellow price tag among white tags or a coloured waste label on black or white packaging and waste receptacles. This tendency is called salience bias (Schenk, 2011).

Colours can be of great influence in creating perceptual salience, as they help us see things quicker and remember them better (Witzel & Gegenfurtner, 2018). In general, colour has a great visual impact on consumers (Albizzati et al., 2023). We use colours in everyday life to help identify objects and we refer to colours in our communication with others (Witzel & Gegenfurtner, 2018). Placed next to – oftentimes – black on white text on packaging, colours stand out and catch the attention of the consumer. Colours focus our attention and help us categorise objects. The latter point is important as grouping things into categories is efficient for the brain and often happens based on perceptual properties like colour (Ashby & Zeithamova, 2022). By colour coordinating waste labels across packaging or waste receptacles, the brain will easily and effectively connect packaging products to waste fractions.

### **User experiences with the Nordic waste pictograms**

In a 2023 Danish study on the effect of waste signs at apartment building collection points, out of 91 questioned residents, 85 (more than 90%) found it easy – to a high or very high degree – to read signs, with the Nordic pictograms, from a distance (City of Copenhagen, 2023b; see Appendix A). The signs were hanging above the dedicated waste fraction containers showing the fraction pictogram, name, and colour.

Furthermore, the study shows that the connecting link between different waste communication elements is important for the user experience and understanding. More specifically, uniformity in visual style, information load, colours and visual link to the waste pictograms made it easier and more pleasant for the residents to read the signs. In the study, a few basic signs with supplementary waste sorting information were placed at the collection points in all test groups. Some of these signs had a different visual style, which was reported by the residents to lower the user experience and understanding (City of Copenhagen, 2023b).

This indicates that a harmonisation of waste symbols could be an important step to increase waste sorting at source, not only by harmonising symbols across member states, but also within member states across different communication elements.



# Make it intuitive – matching labels on products and waste receptacles

Even when labels on products and waste receptacles are used to assist sorting, they can create confusion when not properly coordinated between producers and waste collectors, when producers are required or allowed to display several uncoordinated labels or when different producer groups establish their own labels (RECOUP, 2019; UNEP, 2020; Albizzati et al., 2023). In a stakeholder workshop in 2022 by the JRC, about half (6 out of 13) of the stakeholders believe that the positive effect of harmonising waste pictograms at EU level would only occur if symbols were matched on products and waste receptacles (Albizzati et al., 2023). According to the authors, it is indispensable to complement a labelling system for packaging with matching information on waste receptacles to achieve the full benefits of such a system and “the clearest guidance to citizens consists of two matching labels, one on the waste item and one on the waste receptacle” (Albizzati et al., 2023, p. 7).

In this section, we elaborate on this point arguing that an expansion of the harmonised label system to include waste receptacles, as well as product packaging will have a positive impact on citizens' waste sorting. Firstly, we argue that the matching labels on waste receptacles offer in-the-moment informative cues that are intuitive to understand and easy to act upon. Secondly, we argue that harmonised labels on waste receptors offer normative cues of the expected behaviour.

## Waste labels as informative cues

For the waste labels to work *as informative cues*, it is important that they guide sorting behaviour intuitively with little to no deliberate cognitive effort needed. If symbols on product packaging are matched with symbols on waste receptacles, it goes without saying that the task of the citizen is very intuitive and simple: Match the two symbols. In the Nordic countries, the matching pictograms on packaging and waste receptacles create a strong visual link, that makes it easier for citizens to sort their waste correctly (Circular Denmark, 2022b). On top of this, the matching system will make it easier to keep the design of the waste labels simple and salient as argued for in the previous section “Keep it simple – the Nordic pictogram system as a role model”.

Even without requirements for waste labels on product packaging, studies show an effect of pictograms on waste receptacles. In a 2023 Swedish study, different signs and nudging elements were tested in apartment building's waste areas. The study was carried out as a two-month experiment in three different areas of Stockholm, each of which was divided into different treatment groups and a control group. When waste pictograms were added to the waste receptacles, it resulted in 11.4% less residual waste, implying that this amount was now sorted into the correct waste fraction. The study showed that using nudging techniques would increase the sorting rate even more, but the interesting part is that adding the pictograms to waste receptacles alone had a significant effect on the sorting rate. (Avfall Sverige, 2023; see Appendix D).

A similar study from Denmark supports these findings (City of Copenhagen, 2023b). As described earlier, this study tested the effect of waste signs at apartment building's waste areas (see Appendix D). The study was carried out as an experiment with 21 apartment buildings divided into three treatment groups and one control group. In the 17-week experiment period, one of the treatment groups had existing waste signs replaced with simple pictogram signs showing the fraction pictogram, colour, name, and nothing else. In the pictogram sign treatment group, the level of residual waste was reduced by 15.7% in

the experiment period, while there were no general changes measured in the control group. This implies a much higher waste sorting rate as an effect of pictogram signs (City of Copenhagen, 2023b).

In the same treatment group, the number of residents saying that they actively used the pictograms to guide them in their waste sorting, increased significantly from 4% to 26%. When in doubt about how to dispose of a waste item, the pictograms made 22 percentage points more residents check the information at the collection point. Some of the residents even say they have discovered new waste fractions because of the signs (City of Copenhagen, 2023b). One explanation is that the signs offer a visual and easily processed overview of the fractions at the collection point.

In Denmark, the Nordic Pictogram System has been accessible for all public and private organisations since 2017. In 2021, Denmark introduced nationally harmonised rules on household and office waste sorting including requirements for all waste receptacles to be marked with the Nordic waste pictograms by January 1<sup>st</sup>, 2022 (Danish Environmental Agency, 2024).

One year later, in 2023, the annual citizen survey in Copenhagen showed that 84% of residents remember having seen the waste pictograms, compared to 65% in 2022. 34% of these residents, have seen the pictograms on waste receptacles, and 34% have seen them on product packaging. Of the 84% who remember the pictograms, 88% fully or mostly agree that the pictograms on waste receptacles make it easier for them to sort their waste correctly. 53% agree, fully or mostly, that they have become more aware of waste sorting after seeing the pictograms on the waste receptacles. And 80% agree, fully or mostly, that they look for the pictograms when they are searching for the correct waste receptacle for a waste item. (City of Copenhagen, 2023c).

### Waste labels as normative cues

For waste labels to work as *normative cues* revealing information on social norms, they must be visible in the context of EU citizens. From social science research, we know that context strongly affects behaviour. Humans act differently dependant on the context, even with the same opportunities at hand. Within behavioural science, the broken window theory describes this phenomenon. The theory describes how the physical environment (such as a broken window) sends social signals about the area (such as 'criminal') and thereby changes the behaviours of people in that environment (Wilson & Kelling, 1982).

As pointed out in a Swedish study, the broken window theory also applies to waste sorting areas and collection points (Avfall Sverige, 2023). In this study, the researchers find that when waste areas in apartment buildings appear nice, clean, and cared for, it has a positive impact on the waste sorting behaviours of the residents (Avfall Sverige, 2023).

A Danish study implies that harmonised pictograms on waste receptacles can be an easy way of making waste areas appear more cared for signalling a positive social norm on waste sorting (City of Copenhagen, 2023b). As described earlier, this study tested the effect of waste signs at apartment building's waste areas. The study was carried out as an experiment with 21 apartment buildings divided into three treatment groups and one control group. In the 17-week experiment period, one of the treatment groups had existing waste signs replaced with simple pictogram signs showing the fraction pictogram, colour, name, and nothing else. In this group, the study showed a significant rise in positive social norms on waste sorting. In this treatment group, the number of residents who believed that almost all their neighbours sort their waste, increased from 1 out of 10 to one fourth (from 11% to 26%) in a before and after questionnaire completed by 82-99 residents (City of Copenhagen, 2023b).

The Danish study also found that the pictogram signs made the collection points look more professional and well-maintained in the eyes of the residents, sending a signal that waste sorting is important and that it is in the interest of authorities to help guide their citizens on how to do it (City of Copenhagen, 2023b).

### **Social norms on waste sorting**

In Copenhagen, the social norm effect of the Nordic pictograms on waste receptacles in public institutions have been measured indicating a strengthened waste sorting norm after the introduction of the pictograms. The effect is currently being measured, but preliminary 2023-2024 measures indicate a stronger waste sorting norm than in the 2020 baseline survey. In the same period, the self-reported waste sorting behaviour has increased from 76.4% to 83.4% and more people report that they find waste sorting important (City of Copenhagen, ongoing). This indicates a correlation between the waste sorting norm and the actual waste sorting behaviour. In other words, it is likely that the social norm of waste sorting has been strengthened in this period leading more people to sort their waste.

The social norm effect cannot be attributed to the harmonisation of waste pictograms alone. It must be attributed to the shared effort of actions on waste sorting in Copenhagen, Denmark, Europe, and globally. However, the positive effect does indicate that changes in the environment have an important impact on waste sorting behaviour, as several actions have been made in Denmark and Copenhagen specifically, to make waste sorting more convenient, visible, and accessible. In Copenhagen actions include harmonisation of pictograms on waste receptacles and more visible waste receptacles in the public area.

# Appendix A: Eye tracking study comparing waste signs and symbols

In this appendix we present the results of an eye tracking study comparing four waste signs of various complexity, one of which is the Nordic paper waste pictogram. The study is based on the AI eye tracking tool "Neurons Predict" by Neurons.

## How it works

Predict's AI is built on a database of eye tracking data from consumer neuroscience studies of eye movements and brain responses. This allows the Neurons Predict tool to predict human visual perception with – according to the company itself – more than 95% accuracy. (Neurons, 2024).

## Explanation of scores

The eye tracking tool predicts the attention of observants in four scores of which two are in beta versions and for that reason ignored here. The two remaining scores are "focus" and "cognitive demand", both of which are based on an index of 0 to 100.

**Focus:** The focus score describes the amount of focused attention by the observant. Low focus (0-24) means many elements compete for attention, while high focus (75-100) means one or few narrow areas draw the most attention and will be more likely to be noticed (Neurons, 2024). For the waste labels a high focus is ideal.

**Cognitive Demand:** The cognitive demand score measures how much information viewers need to process. High scores (75-100) indicate complexity that can overwhelm viewers, while low scores (0-24) mean it is easy to process, which may also decrease viewing time. (Neurons, 2024). For the waste labels a low cognitive demand is ideal.

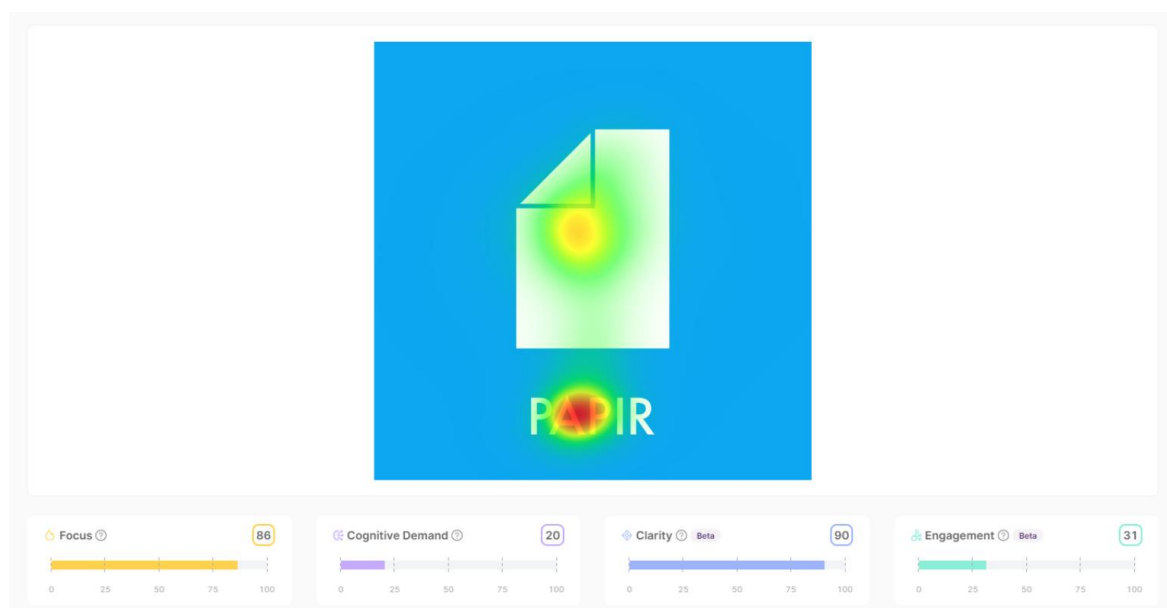
## Results

### 1. The Nordic paper waste pictogram with fraction name in Danish.

Focused attention: 86 = high focus. (Ideally 75-100).

Cognitive Demand: 20 = low cognitive demand. (Ideally 0-24).

The Nordic waste pictogram has a high focus score and a low cognitive demand score, which is ideal for an in-the-moment cue meant to be noticed and understood in few seconds.

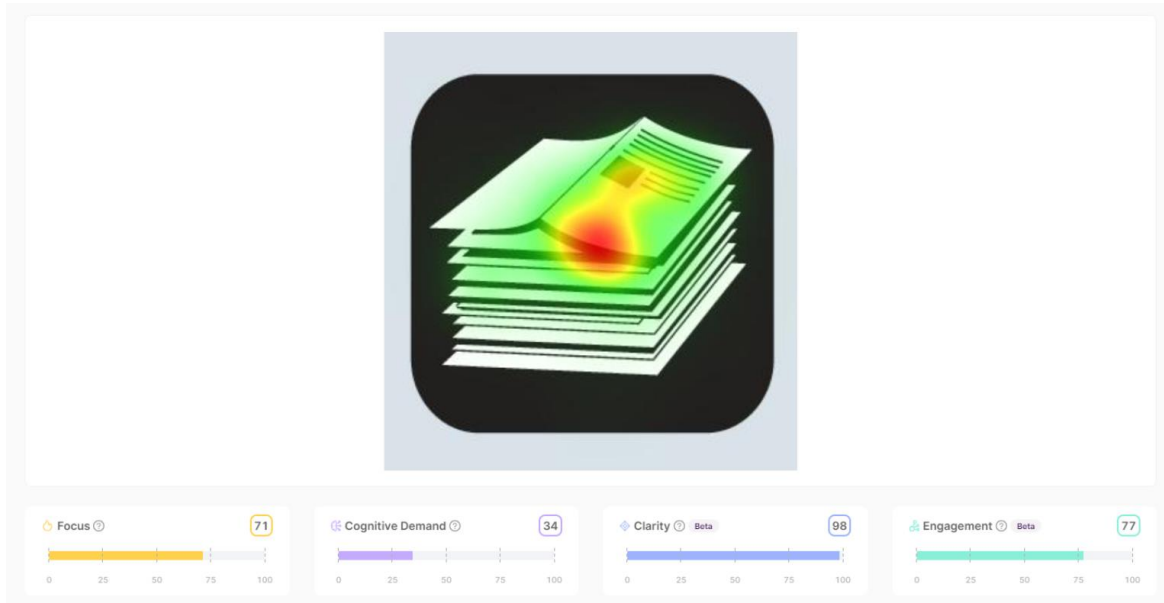


## 2. Randers Municipality, Denmark. Obsolete paper pictogram without text.

Focused attention: 69 = relatively high. (Ideally 75-100).

Cognitive Demand: 34 = relatively low. (Ideally 0-24).

This pictogram has a relatively high focus score, although lower than the Nordic waste pictogram, meaning that more areas are competing for attention. It has a relatively low cognitive demand score, although again higher than the Nordic pictogram, meaning viewers have more information to process.

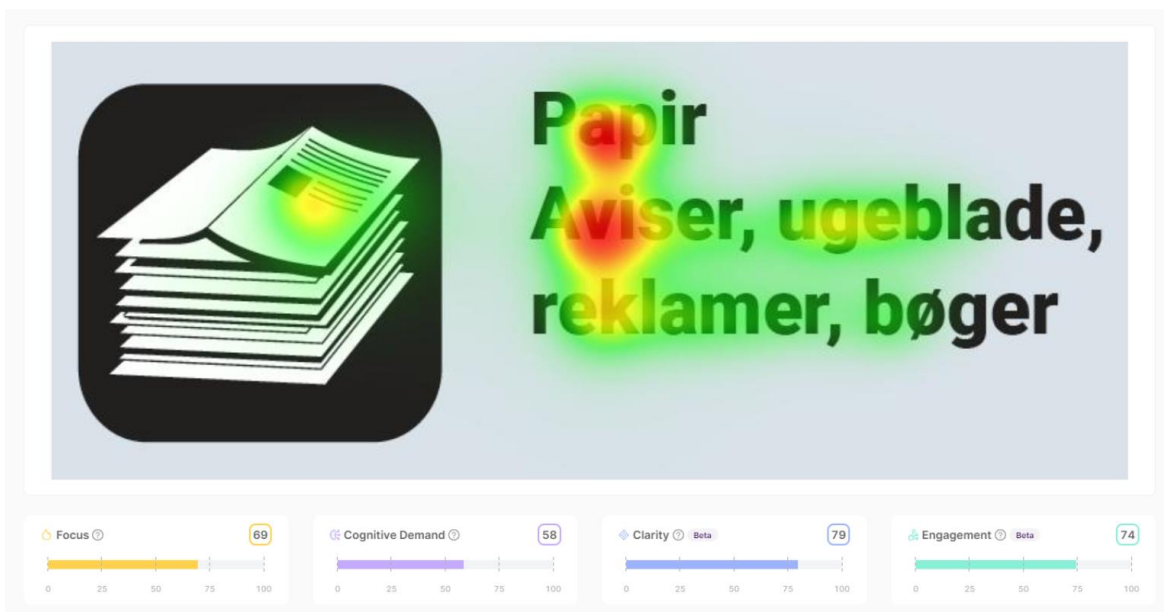


## 3. Randers Municipality, Denmark. Obsolete paper waste pictogram with text.

Focused attention: 71 = relatively high. (Ideally 75-100).

Cognitive Demand: 58 = relatively high. (Ideally 0-24).

Like the other Obsolete pictogram from Randers Municipality, this pictogram has a relatively high focus score, though higher than the Nordic pictogram. The cognitive demand score, however, is relatively high meaning that the added informational text comes at the cost of a higher cognitive demand.

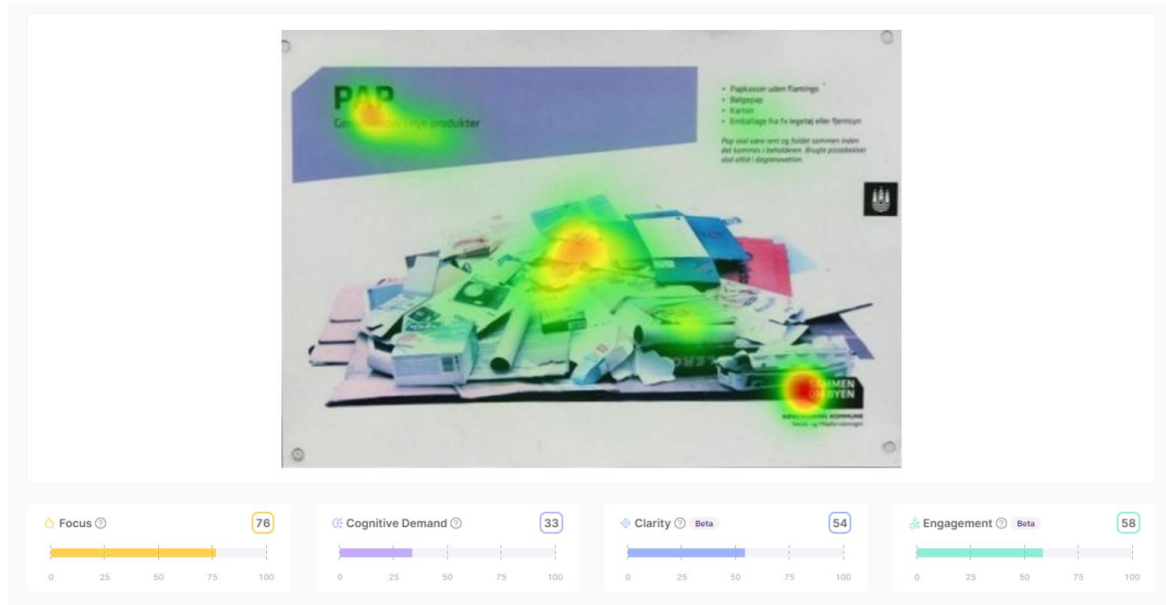


#### 4. Copenhagen Municipality, Denmark. Obsolete cardboard waste sign with photo and text.

Focused attention: 76 = high. (Ideally 75-100).

Cognitive Demand: 33 = relatively high. (Ideally 0-24).

Even though this waste sign includes a lot of information, the hierarchy is clear. For this reason, the focus score is high. However, because of its complexity, the cognitive demand is higher than ideal for an in-the-moment, easily processed waste label.



## Appendix B: Waste pictograms from the Danish study on reaction time

Here we show an example of how the Nordic pictograms were presented to participants in the in the unpublished Danish survey experiment on reaction time "Adfærdsundersøgelse for effektiv implementering af sorteringskriterier" (Ministry of the Environment and Food, 2019) referred to in this document.

The survey was completed with seven of the Nordic waste pictograms. They were pictograms for plastic, metal, cardboard, paper, glass, food, and residual waste (Ministry of the Environment and Food, 2019).

Treatment group 1



Treatment group 2



Treatment group 3



**Alt spiseligt: madrester, fraskær fra madvarer, fødevarer, der er for gamle mv. Herudover teposer, kaffefiltre, afskårne blomster og køkkenrulle.**  
Bliver til biogas og gødning (afgasset biomasse og kompost).

## Appendix C: Pictogram signs from the Danish study on waste signs

Here we show the pictogram signs from the unpublished Danish experiment study on waste signs "Test af skiltekoncept – Øget genanvendelse og bedre brugeroplevelse på standpladser" (City of Copenhagen, 2023b) referred to in this document.



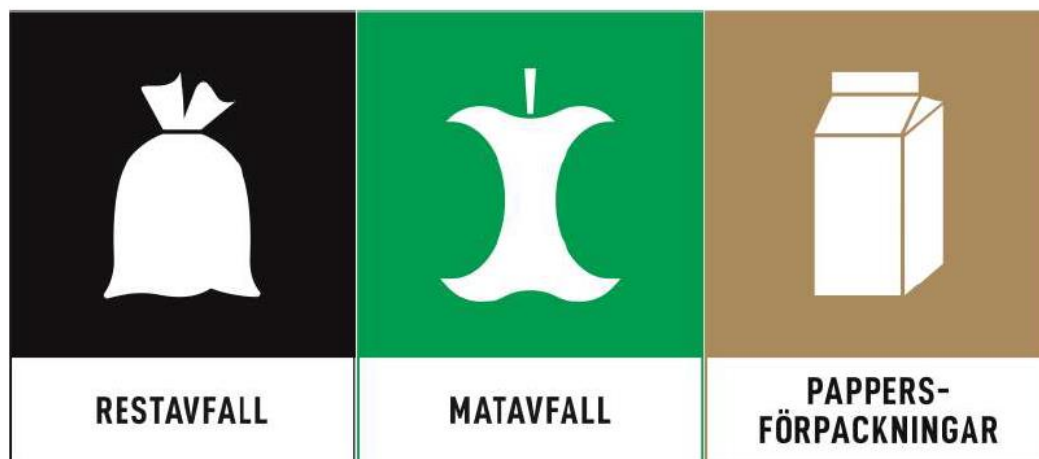


# Appendix D: Waste pictograms from the Swedish study on waste signs

In the following we show the pictograms tested in the Swedish experiment study on waste signs "Beteendepåverkan i kombination med nytt skyltsystem – del 2" (Avfall Sverige, 2023) referred to in this document. The pictures stem from the report (Avfall Sverige, 2023, p. 16).

## Nya skyltar, 300 x 400 mm

Bild 1 – Exempel på nya skyltar



## Information om skyltsystemet, 500 x 700 mm

Bild 2 - Information om skyltarna i det nationella skyltsystemet



# References

Albizzati, P., Cristóbal Garcia, J., Antonopoulos, I., Egle, L., Foster, G., Gaudillat, P., Marschinski, R., Pierri, E. & Tonini, D. (2023). *Harmonised labelling of waste receptacles with matching product labels*. Publications Office of the European Union, Luxembourg, doi:10.2760/09021 (online), JRC132348.

Ashby, S. R. & Zeithamova, D. (2022). Category-Biased Neural Representations Form Spontaneously during Learning That Emphasizes Memory for Specific Instances. *Journal of Neuroscience*. February, 42(5): 865-876. DOI: 10.1523/JNEUROSCI.1396-21.2021

Avfall Sverige (2023). *Beteendepåverkan i kombination med nytt skyltsystem – del 2*. Avfall Sveriges Utvecklingssatsning. Rapport 2023:28. ISSN 1103-4092. Conducted by Adolfsson, M., Nudgd.

Circular Denmark (2022a). (Formerly Dansk Affaldsforening). *Affaldspiktogrammer udbredt til Estland, Letland og Litauen*. <https://cirkulaer.dk/nyheder/affaldspiktogrammer-udbredt-til-estland-letland-litauen>. Accessed March 12, 2024.

Circular Denmark (2022b). (Formerly Dansk Affaldsforening). *User Guide. Danish pictogram system for waste sorting, collection services & recycling centres*. <https://cirkulaer.dk/files/media/document/UserManual-DanishWastePictograms-Jan2022-english.pdf>

Cristóbal, J., Pierri, E., Antonopoulos, I., Bruns, H., Foster, G. & Gaudillat, P. (2022). *Separate collection of municipal waste: citizens' involvement and behavioural aspects*. Publications Office of the European Union, Luxembourg. doi:10.2760/665482, JRC131042.

City of Copenhagen (2023a). *Affald Kbh. Lejligheder*. May 2023. [https://kk.sites.itera.dk/apps/kk\\_pub2/pdf/2598\\_19d76e0cf840.pdf](https://kk.sites.itera.dk/apps/kk_pub2/pdf/2598_19d76e0cf840.pdf), Accessed March 12, 2024. (A printed copy was distributed with a sheet of waste pictogram stickers to apartment households in the municipality of Copenhagen).

City of Copenhagen (2023b). *Test af skiltekoncept – Øget genanvendelse og bedre brugeroplevelse på standpladser*. Conducted by Bro Kommunikation A/S. Not published.

City of Copenhagen (2023c). *Borgermåling*. Conducted by Norstat.

City of Copenhagen (ongoing). *Københavnernes sociale norm for affaldssortering*. Conducted by Bro Kommunikation A/S. Not published.

Danish Environmental Agency (2024). *Strømlinet affaldssortering*. <https://mst.dk/borger/affald-og-forurening/sortering-af-affald/stroemlinet-affaldssortering>. Accessed March 12, 2024.

Kahneman, D. (2011). *Thinking, fast and slow*. Farrar, Straus and Giroux.

KL, Local Government Denmark (2015). *Fælles Farve- og Piktogramsystem til visuel affaldskommunikation. En undersøgelse af muligheder og barrierer*. Conducted in collaboration with Koch & Falk.

Ministry of the Environment and Food (2019). *Adfærdsundersøgelse for effektiv implementering af sorteringskriterier*. A survey experiment conducted by Bro Kommunikation A/S. Not published.

Neurons (2024). <https://www.neuronsinc.com/>. Accessed March 13 2024.

OPRL (2023). *What consumers want. 7 key research insights on engaging consumers in recycling*. <https://oprl.org.uk/what-we-do/what-consumers-want/>

Jacoby, L. L. & Dallas, M. (1981). On the relationship between autobiographical memory and perceptual learning. *Journal of Experimental Psychology: General*. 110 (3): 306–340. doi:10.1037/0096-3445.110.3.306. ISSN 0096-3445.

Reber, R., Winkielman, P. & Schwarz, N. (1998). Effects of Perceptual Fluency on Affective Judgments. *Psychological Science*. 9 (1): 45–48. CiteSeerX 10.1.1.232.8868. doi:10.1111/1467-9280.00008. ISSN 0956-7976.

RECOUP (2019). *Research study into consumer plastic recycling behaviour*. <https://www.recoup.org/p/348/pledge-2-recycle-plastics-consumer-insight-recycling-study-2019>

Schenk, D. H. (2011). *Exploiting the Salience Bias in Designing Taxes*, 28 Yale J. <https://digitalcommons.law.yale.edu/yjreg/vol28/iss2/2>

Thaler, R. H., & Sunstein, C. R. (2021). *Nudge: the final edition* (Final edition.). Penguin Books, an imprint of Penguin Random House LLC.

Tonglet, M., Phillips, P. S., & Read, A. D. (2004). Using the Theory of Planned Behaviour to investigate the determinants of recycling behaviour: A case study from Brixworth, UK. *Resources, Conservation and Recycling*, 41(3): 191214. <https://doi.org/10.1016/j.resconrec.2003.11.001>

UNEP (2020). *Can I Recycle This? - A global mapping and assessment of standards, labels and claims on plastic packaging*. <https://www.oneplanetnetwork.org/report-can-i-recycle>

Wilson, J. Q. & Kelling, G. L. (1982). *Broken Windows*. [www.theatlantic.com](http://www.theatlantic.com). Archived from the original on April 18, 2009. Accessed March 12, 2024.

Winkielman, P., Cacioppo, J. T. (2001). Mind at ease puts a smile on the face: Psychophysiological evidence that processing facilitation elicits positive affect. *Journal of Personality and Social Psychology*. 81 (6): 989–1000. doi:10.1037/0022-3514.81.6.989. ISSN 0022-3514.

Witzel, C. & Gegenfurtner, K. R. (2018). Color Perception: Objects, Constancy, and Categories. *Annual Review of Vision Science*. 4(1): 475-499. <https://doi.org/10.1146/annurev-vision-091517-034231>.

Zajonc, R. B. (2001). Mere Exposure: A Gateway to the Subliminal. *Current Directions in Psychological Science*. 10(6): 224-228. <https://doi.org/10.1111/1467-8721.00154>