

Cambridge AS & A Level · Psychology 9990 · Notes

The physical environment A2

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Last checked 6 October 2026

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What you need to know

The physical environment is the first topic of the Consumer psychology option (Papers 3 and 4): how the look, sound, smell and busyness of a place change what shoppers and diners feel and do. You should be able to:

1. **Store exterior design:** describe the **storefront**, **window displays** and **landscaping**, with a study such as **Mower et al. (2012)**.
2. **Store interior design:** describe the **grid**, **freeform** and **racetrack** layouts, and how **virtual (online) store layouts** are used, with a study such as **Vrechopoulos et al. (2004)**.
3. **Music in restaurants:** how background music changes how much people spend on food and drink, through the key study **North et al. (2003)**.
4. **Background noise and taste:** how sound and noise change the way food tastes, and **why**, with a study such as **Woods et al. (2011)**, Experiment 1 or 2.
5. **The PAD model:** Mehrabian and Russell's **pleasure-arousal-dominance** model of how ambience affects shoppers.
6. **Odour:** the effect of smell on shoppers' pleasure, arousal and dominance, with a study such as **Chebat and Michon (2003)**.
7. **Crowding:** the effect of crowding on shoppers' pleasure, arousal and dominance, with a study such as **Machleit et al. (2000)**, Study 1 or 2.
8. **Evaluate all of it** with the issues the syllabus names: cultural differences, questionnaires, quantitative and qualitative data, objective and subjective data, ecological validity, individual and situational explanations, reductionism versus holism, determinism versus free will, generalisations, validity and application to everyday life.

Before 2024 this topic also covered retail store architecture (the review by **Turley and Milliman, 2000**), lighting and colour (**Kutlu et al.**), music at market stalls (**Guéguen et al., 2007**) and casino design (**Finlay et al., 2006**). These are **not** on the current syllabus; Turley and Milliman and Guéguen et al. appear briefly below only because older questions ask about them.

Understand it

Retail atmospherics

Retail atmospherics are the parts of a shopping space that the retailer **can control on purpose** (layout, window display, music, lighting, smell, how many people are let in) to make people **come in, stay longer** and **buy**. The topic at a glance:

Part of the topic	Atmospheric	Study
Store design	exterior (storefront, windows, landscaping)	Mower et al. (2012)
Store design	interior layout (grid, freeform, racetrack), online too	Vrechopoulos et al. (2004)
Sound	background music	North et al. (2003)
Sound	background noise	Woods et al. (2011)
Ambience	odour (smell)	Chebat and Michon (2003)
Ambience	crowding	Machleit et al. (2000)

The models of ambience below explain **why** each of these changes behaviour.

Store exterior design

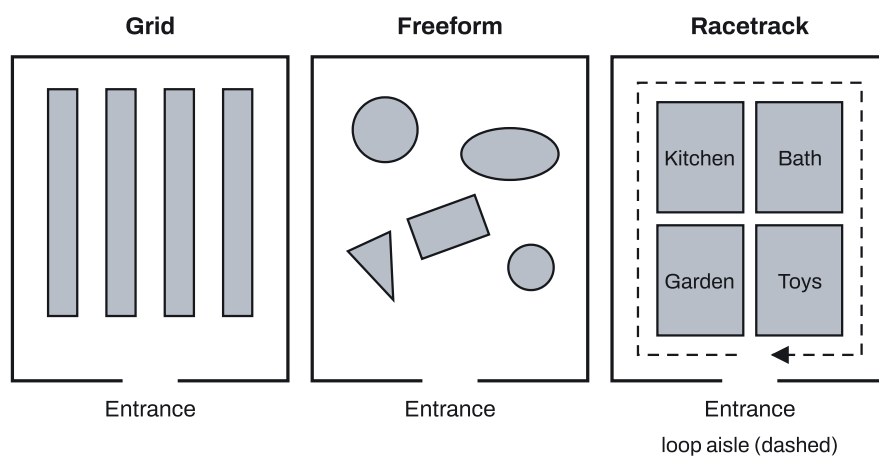
The exterior gives the **first impression** and decides whether a passer-by steps inside.

- **Storefront:** the sign, entrance, doors, materials, colours and lighting of the front. An open, bright entrance invites people in.
- **Window displays:** products arranged behind the glass to show what is sold and the store's style. Windows tend to work best when they are **large**, have a **theme**, use **warm colours** and **lighting** on key items, add matching **accessories**, and fit the shopper's **self-image**; one showing only a price or slogan does less.
- **Landscaping:** plants, flowers, trees, paths and seating outside, which make the store look cared for and pleasant.

Mower et al. (2012) studied two exterior features of a clothing store, **landscaping** and the **window display**. Participants were shown pictures of the same store exterior with or without a window display and with or without landscaping (plants and flowers), and answered a **questionnaire** about how much they liked the exterior, how they felt (pleasure and arousal) and whether they would shop there (**patronage intention**). Both the window display and the landscaping made people **like the exterior more**. Liking the exterior went with feeling more **pleasure** and **arousal**, and pleasure went with a stronger **intention to shop** there.

Evaluating it: pictures give tight **control** (only the feature changes) but low **ecological validity** (a photograph is not a real street). Liking and intention are **subjective** self-reports, and intending to shop is not buying. Which windows appeal may depend on **culture**.

Store interior design: three layouts



Layout	What it looks like	Effect on the shopper	Typical use
Grid	Long, straight aisles running parallel to each other in a rectangle, with shelving on both sides	Easy to find things and move quickly; space is used efficiently; but the shopper is pushed along a fixed route, and it can feel dull	Supermarkets, pharmacies
Freeform	Displays and fittings of different shapes and sizes placed in an irregular, flowing pattern, with no fixed route	Relaxed browsing; people stay longer and look around; but it uses space less efficiently and items can be harder to find	Boutiques, department stores
Racetrack (also called boutique or loop)	One main aisle loops round the store; departments are semi-separate themed areas off the loop	Leads the shopper past as many sections as possible , so more impulse buying and an interesting, entertaining trip; but it is hard to take a short cut	Large furniture and department stores

Virtual store layouts and Vrechopoulos et al. (2004)

Online shops have layouts too, made of menus, links and pages:

- **Virtual grid:** a **hierarchy** of menus, from category to subcategory to product.
- **Virtual freeform:** any product can be reached **straight away**, by a **search box** or by product links shown on every page.
- **Virtual racetrack:** the shopper is led through the sections **one after another** along a set route.

Vrechopoulos et al. (2004) compared the three layouts in a **laboratory experiment** on an online **grocery** store. Participants, from **Greece** and the **UK** (about **120**, chosen to cover different occupations), did a real shopping task with money they were given, and the products were delivered to them. Measures: how **useful**, **easy to use** and **entertaining** the layout was, and how long it **engaged** them.

Measure	Result
Usefulness (for finding the items on a shopping list)	Freeform most useful: best for planned purchases
Ease of use	Grid easiest; racetrack least easy
Entertainment	Freeform most entertaining; grid and racetrack no different
Time (engagement)	Racetrack and freeform kept shoppers longer than grid ; grid was the fastest

The researchers concluded that layout does affect online shopping, and a mixture of grid and freeform may suit an online grocery store best. Keep the measures apart: "useful" is not "preferred" or "easy".

Evaluating it: a fair-sized sample from two countries and a **standardised** procedure help **generalisation** and **reliability**, the **quantitative** ratings can be compared, and it is **useful** to online retailers. But groceries bought from a list are not clothes or books, where people browse, and participants knew they were studied and were not spending their own money. Don't criticise this study for being unlike a real shop: it set out to study online shopping, so that point was not credited (June 2022 report).

Weaknesses of using virtual layouts to study store design in general: there is no **real space** to walk round, so the body's movement cues (**idiothetic** input), **smell** and **crowding** are missing, and virtual reality can cause **simulator sickness** (dizziness, nausea, eyestrain).

Music in restaurants: the key study North et al. (2003)

Aim: to see whether the **style** of background music played in a restaurant affects how much customers spend.

Method: a **field experiment** in one **upmarket restaurant** in **Leicestershire**, England, with an **independent measures** design (each diner heard only one condition).

Participants: **393** diners (an opportunity sample, roughly equal numbers of men and women): **120** heard classical music, **142** pop music and **131** no music.

IV: the music: **classical**, **pop** or **no music**.

DV: spend per person (£) on starters, main courses, desserts, coffee, bar drinks and wine, and the **total**. Time spent at the table was recorded and allowed for, as longer stays mean more spending.

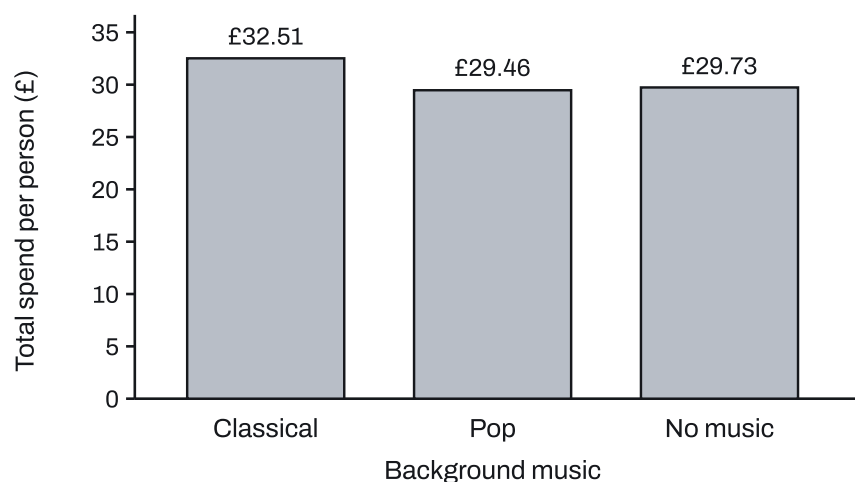
Procedure and controls:

- The study ran on **18 evenings** over **3 weeks** (the restaurant was closed on Sundays), so each condition was used on **6** evenings.
- **Counterbalancing:** a **Latin square** meant **each type of music was played on each day of the week** (Monday to Saturday) once, so the day could not be **confounded** with the music. The three weeks were **equivalent** (no holidays).
- **Music:** two **76-minute** CDs per music condition, played in **random** order at a **constant background volume**, so no customer heard a piece twice.

- Kept the same: **lighting**, **decor**, **temperature**, the **menu** and prices, and the **same waitress** recorded the data.

Results (average spend per person):

Spending on	Classical	Pop	No music
Total	£32.51	£29.46	£29.73
Starters	£4.92	£4.04	£3.93
Coffee	£1.06	£0.80	£0.53
Wine	less	less	£5.05 (highest)



- Total** spend was highest with **classical** music, about £3 a head more than with pop or no music; pop and no music were almost the same.
- The **biggest differences** were on **coffee** (with classical, twice as much as with no music) and **starters**. There was very little difference on **main courses** and **desserts**.
- Wine** alone was highest with **no music**, which was not expected; but adding all drinks together (bar drinks and wine), spending was highest with classical music.

Conclusion: classical background music increased spending in this restaurant. North et al. suggested three reasons: classical music **fits** an upmarket restaurant (**synergy**, or "musical fit"); people may simply **like** classical music more; or classical music creates a sophisticated, **upmarket atmosphere** that makes people willing to pay more. They thought the third the most likely.

Evaluating it:

- Ecological validity:** real diners spending their own money, unaware of the study, hearing music restaurants really play. But less control: a busy evening (slower service, fewer desserts) could differ from a quiet one.
- Controls and reliability:** the Latin square, CDs, volume, lighting, menu and same waitress make it fair and repeatable.

- **Generalisations:** a large mixed sample, but **one** upmarket restaurant, probably well-off diners, and only **two** music styles; a fast-food restaurant or another country might differ.
- **Ethics:** no consent or debrief, but no harm, and bills were anonymous.
- **Data:** spending is **objective** and **quantitative**, but with no **qualitative** data on **why** people spent more, we cannot tell which explanation is right.
- **Situational, individual and determinism:** the music is a **situational** cause that seems to push spending up unnoticed (**environmental determinism**), but each diner's budget and occasion (**individual** factors) and their own choices still matter, so this is **soft** determinism at most.

Background noise and taste: Woods et al. (2011)

Woods et al. ran two **laboratory experiments** on how background noise changes the taste of food.

- **Procedure:** **blindfolded** participants wearing **headphones** ate small amounts of sweet and salty foods (such as biscuits and crisps) while hearing **no sound**, **quiet** white noise (about **45–55 dB**) or **loud** white noise (about **75–85 dB**), a steady meaningless hiss.
- **Design:** **repeated measures** (every participant did all the sound conditions), with the **order counterbalanced**.
- **Experiment 1 (DV):** ratings of **sweetness**, **saltiness** and **liking**, as a rise or fall from the no-sound baseline.
- **Experiment 2 (DV):** ratings of **flavour**, **crunchiness** and **liking**, plus how much participants **liked the noise**; **34** participants.

Results:

- Experiment 1: **sweetness** and **saltiness** were rated **significantly lower** with **loud** noise than with quiet noise. Liking was also lower with loud noise, but not significantly.
- Experiment 2: **crunchiness** was rated **more intense** with loud noise. People who **liked the noise** more also **liked the food** more (a **correlation**).

Why sound influences taste:

1. **Attention:** loud noise grabs attention, leaving less to notice the taste, so sweetness and saltiness seem weaker.
2. **Cross-modal contrast:** a strong signal in one sense (hearing) makes a weak one in another sense (taste) seem weaker by comparison.
3. **Sound-related properties differ:** crunchiness is partly judged by hearing, and it moved the **opposite** way to sweetness and saltiness.
4. **Mood:** liked noise puts us in a better mood, which carries over to the food.

Application: food eaten in noisy places (aircraft cabins, food courts) may taste less sweet and salty but crunchier, so caterers may add flavour or reduce noise.

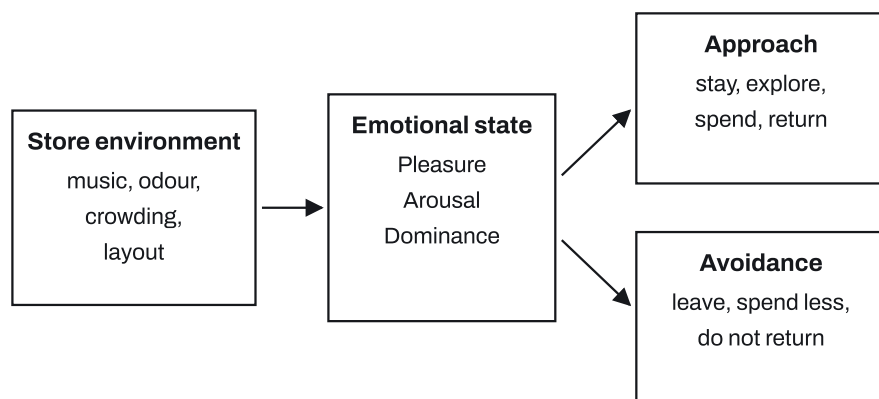
Evaluating it: laboratory **control** (exact noise levels, a baseline) gives evidence of **cause and effect**, and repeated measures removes differences in taste preference between conditions. But it is **reductionist** and low in **ecological validity** (real restaurant noise has voices and music), some **participant variables** were not controlled (disliking a food, preferring salty to sweet, smoking, a cold), the ratings are **subjective**, and the findings are **nomothetic** group averages.

The PAD model of ambience

Mehrabian and Russell (1974) proposed that the physical environment affects behaviour **through the emotions it causes**. Any emotional state can be described by three dimensions, each a scale:

Dimension	Scale	High end feels like	Example in a shop
Pleasure	pleasure–displeasure	happy, contented, satisfied	a pleasant smell, liked music
Arousal	arousal–nonarousal	stimulated, excited, alert	fast, loud music, bright light, a busy crowd
Dominance	dominance–submissiveness	in control, free to act	open space, easy to move and find things

For example, anger and fear are both unpleasant and arousing, but in anger you feel **dominant** and in fear **submissive**.



The environment (the **stimulus**) changes the emotional state, which produces **approach** (staying, exploring, spending, returning) or **avoidance** (leaving, spending less, not returning).

Pleasure leads to approach. **Arousal** strengthens whatever the shopper already feels: in a pleasant store, more arousal increases approach; in an unpleasant one, more arousal increases avoidance. Low **dominance** (feeling hemmed in or controlled) makes the experience less pleasant.

The cognition-emotion model says **thinking comes first**: the shopper **appraises** a cue ("this fresh smell means a good-quality place"), and that **thought** produces the **emotion**, which guides behaviour. The current syllabus names only PAD, but mark schemes still credit this model, and Chebat and Michon need it.

Evaluating the PAD model: it fits any atmospheric and **measures** ambience quantitatively on rating scales, so stores can be compared, and it is **useful** for predicting that a pleasant store keeps people longer. But it is **reductionist** (all emotion as three numbers, with no **qualitative** reasons), **dominance** often adds little, it treats shoppers as **determined** by the environment, and it ignores cognition, which Chebat and Michon found mattered more. It was developed in the West: the dimensions may be universal, but which feelings, smells and music are welcome varies between **cultures**.

Odour: Chebat and Michon (2003)

Aim: to test whether a pleasant smell affects shoppers through their **emotions** (as the PAD model predicts) or through their **thinking** (a cognition-first model).

Method: a **field experiment** in a large **shopping mall** in **Canada**, over **two weeks** in a row (the end of February and start of March). Independent measures:

- **Week 1, no-scent condition** (control): the mall's air was left as it was; **447** shoppers took part.
- **Week 2, scent condition:** a pleasant **citrus** scent was released at regular intervals into the mall's main corridor, at a level just strong enough to notice without bothering people; **145** shoppers took part.

Controls: **special promotions** were **cancelled** in both weeks; the weeks were consecutive; the scent was released the same way all week; the graduate marketing students handing out questionnaires **wore no perfume**.

DV: shoppers filled in a **self-administered questionnaire** with rating scales about their trip: how they saw the **mall environment**, the **quality of the products**, how much **pleasure** and **arousal** they felt, and what they spent.

Results: with the citrus scent, shoppers rated the **mall environment** and the **quality of products** more **favourably**. The pattern fitted the **cognition-emotion** (cognition-arousal) explanation better than the PAD model: the scent first changed how shoppers **saw** the mall, and this then affected their feelings. The study did **not** show that the citrus scent simply made people spend more at the shops.

Evaluating it:

- **Ecological validity:** real shoppers doing normal shopping in a real mall. But the weather and the number of shoppers were not controlled and might change how far the scent spread.
- **Questionnaires:** many shoppers quickly, the same items for all (**reliable**), easy consent; but open to **demand characteristics** and **social desirability**, and fixed scales may not match a shopper's real view.
- **Quantitative and qualitative data:** the **quantitative** ratings let the two weeks be compared statistically; with no **qualitative** data, shoppers could not say in their own words what they noticed.
- **Objective and subjective data:** age and gender are **objective**; ratings of quality and pleasure are **subjective**.
- **Generalisations and culture:** one mall in one country; which smells are pleasant varies between cultures, and many shoppers elsewhere use open-air markets.
- **Application:** a mild pleasant scent can improve how a mall and its products are judged.

Crowding: Machleit et al. (2000)

- **Density is physical:** how many people or objects per square metre.
- **Perceived crowding is psychological:** the feeling of **too little space** for what you want to do. Because it is a feeling, **two people in the same shop can differ**.
- **Human (social) density:** the **number of people** and how much they interact and get in each other's way.
- **Spatial density:** how the **merchandise, fixtures and fittings** fill the space (narrow aisles blocked with stock).

Machleit et al. (2000) reported two studies of how **perceived crowding** affects **shopping satisfaction**, both using **questionnaires**. Perceived crowding was measured with an **eight-item, two-part Likert-type scale** (each item rated **1 to 7**): **four** items on **human** crowding (statements that the store seemed very crowded, was a little too busy, or had a lot of shoppers, and one reverse-scored item saying there was little traffic) and **four** on **spatial** crowding. When asked for this questionnaire, give a **human** item as your example: a spatial item (about how spacious the store seemed) scored 0. Emotions and satisfaction with the trip were also measured.

Findings: the more crowded shoppers felt, the **less satisfied** they were with the trip, partly because crowding reduced their **pleasant emotions** and raised unpleasant ones. The effect was **changed** by other factors, for example whether the shopper **expected** a crowd and how much they could **tolerate** crowding, and it differed between **types of store**.

Crowding and the PAD model: high density makes it hard to move, reach products or see displays, so shoppers feel **less in control** (low **dominance**); it is noisy and busy (high **arousal**); together these make the visit **unpleasant** (low **pleasure**). Unpleasant arousal leads to **avoidance**: leaving early, buying less and not coming back.

Evaluating it: questionnaires ask shoppers how they felt, which suits a **perceived** state, and reach many people; but they are **subjective**, open to social desirability, and fixed scales may force answers. Shoppers from **cultures** used to busy markets may feel less crowded at the same density. It is **useful**: stores can widen aisles and cut clutter (spatial density) or manage queues (human density).

Issues and debates for this topic

Issue	How it applies here
Determinism versus free will	Crowding, music and scent are external forces the shopper does not control, so behaviour seems determined ; but shoppers still choose what to buy, so it is soft determinism at most. It is hard to test: shoppers often don't know what caused their behaviour, may not admit a smell made them buy, and are influenced by both at once.
Reductionism versus holism	Studies isolate one variable (white noise, one scent) and PAD reduces feelings to three numbers, but real shops combine many atmospherics that interact. North et al.'s several explanations are more holistic .

Issue	How it applies here
Individual and situational explanations	Atmospherics are situational ; budget, music taste, tolerance of crowds and reasons for shopping (individual) change how much each shopper is affected.
Nomothetic approach	General laws from many participants (loud noise makes food less salty; classical music raises spending) allow prediction, but say little about one shopper (idiographic).
Ecological validity	High in field studies (North, Chebat and Michon); low in laboratory or picture studies (Woods, Vrechopoulos, Mower).
Generalisations and cultural differences	One restaurant, mall, country or type of shop limits how far results apply; liked music, smells, windows and acceptable crowding vary between cultures.
Questionnaires; types of data	Mower, Chebat and Michon and Machleit used questionnaires of quantitative , subjective ratings; North used objective spending data; there was little qualitative data on why people reacted.
Application to everyday life	Retailers use windows, layouts, music, scent and crowd control to raise sales; caterers can allow for noise.

Older syllabus content (2021–2023 questions only)

- **Turley and Milliman (2000) reviewed** about sixty earlier studies of atmospherics (a review collects and analyses many studies on one question, rather than collecting new data). They grouped atmospheric variables into five kinds: **external**, **general interior**, **layout and design**, **point-of-purchase and decoration** (point-of-purchase displays, price displays, signs and cards, artwork, wall decorations, certificates), and **human** variables (crowding, staff). Most of the studies found atmospherics affected sales.
- **Guéguen et al. (2007):** a **field experiment** at an open-air **market stall** in France, with **240** shoppers (154 men and 86 women) randomly assigned to **music** or **no music**. With music, shoppers **stayed longer** at the stall, more of them **bought at least one item**, and some spent more.

Key facts and formulas

There is no formula list in the 9990 exam. "Learn it" means you must remember it.

Fact	Status
Retail atmospherics: the features of a shopping space that a retailer can control (layout, windows, music, scent, lighting, crowding) to draw shoppers in, keep them there and make them buy	Learn it
Store exterior: storefront, window displays, landscaping. Mower et al. (2012): window display and landscaping both increased liking of a clothing store's exterior; liking went with pleasure and arousal, and pleasure with intention to shop	Learn it

Fact	Status
Grid: long parallel aisles, efficient and easy, fixed route. Freeform: irregular flowing displays, browsing, longer stays. Racetrack: a main loop aisle past semi-separate themed areas, impulse buying	Learn it
Vrechopoulos et al. (2004): virtual grocery store; freeform most useful and most entertaining; grid easiest to use and fastest; racetrack least easy; racetrack and freeform engaged shoppers longer than grid	Learn it
North et al. (2003): 393 diners, one upmarket restaurant, Latin square; total per person classical £32.51, pop £29.46, none £29.73; wine highest with no music	Learn it
Woods et al. (2011): blindfolded, headphones, no sound, quiet (45–55 dB) or loud (75–85 dB) white noise, repeated measures. Loud noise: sweetness and saltiness lower, crunchiness higher; liking of noise correlated with liking of food	Learn it
PAD model (Mehrabian and Russell, 1974): environment, then emotional state (pleasure, arousal, dominance), then approach or avoidance	Learn it
Cognition-emotion model: the shopper's appraisal (thought) about a cue produces the emotion	Learn it
Chebat and Michon (2003): Canadian mall, no-scent week then citrus week; better ratings of the mall and product quality; supports cognition-emotion over PAD	Learn it
Machleit et al. (2000): perceived crowding is psychological; human density (people) and spatial density (merchandise, fixtures); 8-item Likert scale rated 1–7 (4 human, 4 spatial); more crowding, less satisfaction	Learn it
Percentage difference = $\frac{\text{difference}}{\text{value compared with}} \times 100$	Learn it

How to do it

We have tagged 52 questions on this topic, from 2021 to 2026 (Papers 3 and 4; 37 different questions, as variants repeat them). 6 of them are wholly about other things: wayfinding, store choice and decision-making systems (other consumer topics), and casino design (Finlay et al.), which is no longer on the syllabus. Of the other 46, 18 have parts of more than one type, so the counts add up to 84.

Question type	Questions
Define or outline a term, layout or model	13
Explain strengths, weaknesses or problems (short)	11
Recall a named study's procedure, IV/DV or results	9
Plan a study and justify it	9
Apply knowledge to a scenario	8

Question type	Questions
Describe and evaluate a topic area (essay)	8
Explain an effect with a model of ambience	7
Discuss strengths and weaknesses of a method, with a conclusion	7
Suggest another way to investigate or measure	5
Explain a study's controls, design or counterbalancing	4
"To what extent" generalisation essay	3

1. Define or outline a term, layout or model (13 questions)

Usually 2 marks: the core meaning (1), then a detail or example from this topic (1).

- **Retail atmospherics:** the controllable features of a shopping space that draw people in and make them buy (1), plus an example such as a layout, a window display, music or a scent (1).
- **A layout:** what it looks like and its effect on the shopper, from the layout table. "It is a grid" with nothing more earns 0; a labelled sketch can earn full marks for the grid.
- **Perceived crowding:** stress **perceived** (a feeling of too little space) and that it differs between people in the same shop. **Human versus spatial density:** people against merchandise and fixtures.
- **A debate with an example** (Paper 3): define the term (1), then an example from the **named** part of the topic (1).
 - **Determinism:** behaviour is caused by forces outside the person's control (external or unconscious); for example, a packed shop is something a shopper has no say over, yet it cuts their pleasure and pushes them to leave.
 - **Nomothetic approach:** studying large groups to find general laws; for example, loud background noise makes food taste less sweet and salty for people in general.

2. Explain strengths, weaknesses or problems (short) (11 questions)

2 marks a point: the point (1), applied to the study or context (1). The evaluation under each study above gives the points.

- **Strengths of studying atmospherics for retailers:** more customers and sales (classical music raised spending on coffee and starters in North et al.); a liked scent or music draws people in and keeps them longer.
- **Why one restaurant study cannot be generalised:** one restaurant is not typical (North's was upmarket, in Leicestershire); classical music may fit only upmarket places (synergy); two styles of music do not represent all music; one country.
- **Strength of a nomothetic approach:** general laws predict behaviour, so businesses can use them; it makes psychology more scientific. "The data is quantitative" alone is not a strength.

- **Problem testing determinism versus free will:** shoppers often **don't know** what caused their behaviour (they focus on what to buy, not the crowd); they may be **embarrassed** to admit a shop feature influenced them; both influences act at once.

3. Recall a named study's procedure, IV/DV or results (9 questions)

Exact details from the study sections above earn marks.

- **Results:** the finding **and** a figure or comparison. For wine: highest with **no music**, £5.05.
- **Conditions of the IV:** name them all; "the scent" or "the background noise" alone earns 1.
- **DV:** say **how** it was measured. **Machleit et al.'s questionnaire:** a human-crowding item, not a spatial one.
- **Vrechopoulos et al.:** keep **useful, easy, entertaining** and **time** apart.
- **A graph of results:** the condition, the direction, then a comparison.

4. Plan a study and justify it (9 questions)

Paper 4. Since 2024: (a) a plan [10] with two named features (such as controls and a hypothesis); (b)(i) the psychological knowledge behind it [4]; (b)(ii) how two features of it shaped the plan [4]; (c) a reason, a weakness and a reason, 2 marks each (the point, then applied to **your** plan). Before 2024: a design [10] and its psychological and methodological evidence [8]. The research-methods note lists each method's features.

1. **Use the method named.** An interview plan needs interview features (face to face or telephone; structured, semi-structured or unstructured; open and closed questions with examples; scoring), not an IV and DV.
2. **Field experiment:** the **IV** with its levels; the **DV** operationalised (spend in £ per person from the bills); the **design** (independent measures); **controls** (menu, prices, lighting, volume, days of the week balanced by a Latin square, same staff); a **hypothesis**.
3. **Hypothesis: directional** when earlier research predicts the direction ("Diners will spend more per person with classical music than with pop music", from North et al.); otherwise **non-directional**. A null hypothesis earns 0 in (c).
4. **General features:** sample and sampling technique, ethics, procedure, quantitative data with a mean for each condition.
5. **(b)(i):** describe the study the plan is built on: North et al., Woods et al., Mower et al., Vrechopoulos et al. or Chebat and Michon.
6. **(b)(ii):** name a feature of that study and say how you **used or changed** it ("North et al. rotated the music across weekdays with a Latin square, so I rotate my conditions the same way").
7. **(c):** a **reason** for your controls (the DV is then caused by the IV), a **weakness** (many controls make it unlike a normal restaurant, or make diners suspicious), each tied to your plan.

Older plans (colour of a display area, store layouts, ambient odour): stay on the topic; lighting is not layout (March 2023 report).

5. Apply knowledge to a scenario (8 questions)

Paper 3, 4–6 marks. Give **two separate suggestions**, each an effect on the customer (1) linked to a study or the PAD model (1), and mention the scenario's goal (fewer complaints, more spending) at least once.

- **Pleasant odour:** shoppers stay longer, visit more shops, rate products as higher quality, feel happier, come back sooner (Chebat and Michon). "The smell is pleasant" repeats the question and earns nothing.
- **Changing a virtual layout:** to **freeform** (most useful, most entertaining, engages longer) or **grid** (easiest, fastest), linked to the complaint; keep it online.
- **Noise while eating:** food seems **crunchier**, **less sweet**, **less salty** and less liked (Woods et al.).
- **Background music:** **genre**, **fit** with the place (synergy), **volume**, playlist **length**; problems: a clashing genre, too loud for talking, regulars disliking the change.

6. Describe and evaluate a topic area (essay) (8 questions)

Paper 3: (a) **describe** [6] (8 before 2024), (b) **evaluate** [10] with a **named issue**.

1. **(a)** Describe everything named: with two bullet points, describing one caps (a) at 4. For a study: setting, sample, conditions, procedure, results with figures, conclusion (for North et al., at least the restaurant or sample, the three conditions and a spending result). No evaluation in (a).
2. **(b)** Issue by issue, the named issue first, using the evaluation points under each study and the issues table, with evidence from (a); then a judgement.

7. Explain an effect with a model of ambience (7 questions)

2–4 marks: outline the model, then apply it. Name the **atmospheric**, say what it does to **pleasure**, **arousal** or **dominance** (or what the shopper **thinks**, for cognition-emotion), then **approach** or **avoidance**.

- **Crowding:** the strongest answers use PAD (low dominance, low pleasure, stressful arousal, avoidance).
- **Chebat and Michon:** PAD (the scent brought pleasure and arousal) or cognition-emotion (the scent improved judgements of the mall, which produced the feelings).
- **One atmospheric on ambience:** liked music raises pleasure and arousal and attracts customers who enjoy it; the same music can put others off.

8. Discuss strengths and weaknesses of a method, with a conclusion (7 questions)

Old Paper 4, 5 marks: two strengths and two weaknesses (1 each), **each about this topic** (field experiments on atmospherics, laboratory experiments on noise, questionnaires on odour or crowding, controls in Woods et al.: take them from the study evaluations above), then a **conclusion** (1): a decision reached by reasoning ("a field experiment is better here, because shopping depends on the whole real store"). A summary scores 0.

9. Suggest another way to investigate or measure (5 questions)

2 marks: the method or measure (1), applied with what is compared (1). A location alone earns 0.

- **Other than spending in North et al.:** time in minutes diners stay; how many order extras (dessert, coffee); how often the same people return; each compared across classical, pop and no music.
- **Other than virtual layouts:** a field experiment timing how long shoppers take to find items in real stores with different layouts; a questionnaire on satisfaction with each.

10. Explain a study's controls, design or counterbalancing (4 questions)

Use the North et al., Woods et al. and Chebat and Michon sections above.

- **Counterbalancing:** say how it was done in that study (North: Latin square, each music on each weekday; Woods: order of conditions varied). "Independent measures" is a design, not counterbalancing.
- **Without it:** the effect in that study (weekend spending confounding the music; boredom or carry-over between noise conditions).
- **Strengths of a control:** the IV is then more likely to cause the DV, with the study's own example.

11. "To what extent" generalisation essay (3 questions)

Old Paper 4, 12 marks: argue **both sides** with research, then a **reasoned conclusion**.

- **Can generalise:** controlled experiments can be repeated anywhere; music is played in shops worldwide; studies agree (North et al.; Guéguen et al.).
- **Cannot:** one place in one country; the music may suit only that place or its customers; what is sold matters; music tastes differ.
- **Conclusion:** for example, that music changes spending generalises, but which style works depends on its fit with the place and customers.

Worked examples

Example 1

On the first morning of a sale, the manager of a sports shop fills the aisles with extra bins of discounted trainers, and a large queue of shoppers forms inside the shop.

(a) Use the pleasure-arousal-dominance (PAD) model to explain **two** effects of these changes on shoppers. [4]

(b) Explain **one** reason why the shop's crowding may affect some shoppers more than others. [2]

(a) The extra bins raise **spatial density** and the queue raises **human density**. Because shoppers cannot move freely or reach the shelves, they feel less in control, so their **dominance** falls (**B1**); feeling hemmed in makes the visit unpleasant, so some leave without buying or decide not to come back to this shop, which is **avoidance** (**B1**).

The noise, pushing and long wait also raise **arousal (B1)**; since the visit is already unpleasant, extra arousal increases avoidance rather than approach, so shoppers spend less time browsing the rest of the shop and buy only the trainers they came for, or nothing (**B1**).

(b) Crowding is **perceived**, a feeling rather than a physical fact, so people differ in how much it bothers them (**B1**). A shopper who came expecting a busy sale day and has a high tolerance for crowds may feel little discomfort and enjoy the bargain hunt, while one who wanted to buy socks quickly may feel crowded and leave; Machleit et al. found expectations and tolerance changed how crowding affected satisfaction (**B1**).

Example 2

(a) Describe the study by Woods et al. (2011) on background noise and the perception of food. [6]

(b) Evaluate this study, including a discussion of reductionism versus holism. [10]

(a) Woods et al. ran two laboratory experiments on how background noise changes the taste of food. Participants were blindfolded and wore headphones, and ate small samples of sweet and salty foods while hearing no sound, quiet white noise (about 45–55 dB) or loud white noise (about 75–85 dB). It was a repeated measures design, with the order of conditions counterbalanced. In Experiment 1 they rated each food's sweetness, saltiness and liking compared with the no-sound baseline; in Experiment 2 (34 participants) they rated flavour, crunchiness and liking, and how much they liked the noise. Sweetness and saltiness were rated significantly lower with loud noise than quiet noise, and liking was lower but not significantly. Crunchiness was rated as more intense with loud noise, and those who liked the noise more liked the food more. The researchers suggested that noise takes attention away from taste, or makes taste seem weaker by contrast, while properties linked to sound, such as crunch, are affected differently.

Why it reaches the top level: aim, method, both experiments' procedures and measures, results with directions and conclusions, accurately and in detail.

(b) *Reductionism versus holism (the named issue)*. The study is reductionist: it isolates one variable, steady white noise, and measures single taste properties with blindfolds removing sight. This shows clearly that noise **alone** can weaken sweetness and saltiness, which a messy real restaurant could not show. But eating is holistic: we see and smell the food, hear conversation and music, and are with other people, and these interact. Real restaurant noise has meaning (voices, clattering plates), which may draw attention differently from white noise. So the study explains one strand but not the whole dining experience.

Ecological validity. Nobody normally eats blindfolded in headphones, so behaviour may differ in a café, though people do eat in noisy places such as aircraft and food courts.

Controls and design. The same laboratory, set noise levels and a baseline make it a fair test, and repeated measures compared each person with themselves, so a love of salty snacks could not explain differences between conditions. But smoking or a cold were not controlled.

Subjective data and generalisations. The ratings were subjective, participants may have guessed the aim, and the samples were small (Experiment 2 used 34 students). Still, caterers in noisy places can use the findings.

Overall, the controlled, reductionist design gives strong evidence that background noise changes taste, but a holistic field study in a real restaurant would be needed to know how much it matters there.

Why it reaches the top level: the named issue first and in depth, several further issues each explained with detail from (a), and a reasoned judgement.

Example 3

An online pharmacy wants to know whether shoppers find products faster in a grid or a freeform virtual layout.

(a) Plan a laboratory experiment to investigate this. Your plan must include details about the experimental design and controls. **[10]**

(c)(i) Explain **one** reason for your choice of experimental design. **[2]**

(a) Aim and hypothesis: to find out whether layout affects how quickly shoppers find items. Directional hypothesis: participants will find a list of eight products in less time with a grid layout than with a freeform layout (based on Vrechopoulos et al., who found grid the easiest and fastest). *IV:* the layout of a mock pharmacy website, grid (category, then subcategory, then product) or freeform (search box and links on every page). *DV:* the time in seconds taken to place all eight items in the basket, recorded by the website, plus a rating of ease of use from 1 to 10. *Design:* **independent measures:** 30 participants use the grid site and 30 the freeform site, randomly allocated. *Controls:* both sites hold exactly the same products, prices, pictures and colours; every participant gets the same printed list of eight items, the same computer, screen and room, and the same instructions; nobody has used either site before. *Sample:* an opportunity sample of 60 adults who shop online, recruited at a college. *Ethics:* informed consent, the right to withdraw, no real money spent, data anonymous, debrief at the end. *Data:* quantitative; compare the mean time and mean ease rating for each layout.

(c)(i) Independent measures means each participant sees only one layout (**B1**), so nobody can get faster on the second site just because they have already learned where the eight products are and what they look like, which would happen with repeated measures (**B1**).

Common mistakes

- **Leaving out "perceived"** when defining perceived crowding: it is a feeling that varies between people, not just a number of people (November 2021 report).
- **Vague study details:** "it included a number of questions" for Machleit et al.'s questionnaire earns nothing; give the Likert-type scale, its range and an example item (November 2021 report). Guessing at a study you don't know (Chebat and Michon's controls) usually scores 0 (March 2023 report).
- **Getting Chebat and Michon wrong:** it took place in a **mall**, not one shop or a supermarket, and it did **not** find that the citrus scent made people spend more; a "practical application" that scent raises spending is not credited, but one about satisfaction and perceived product quality is. It collected quantitative, not qualitative, data (June 2021 report).

- **Naming only one condition of an IV**, or describing how the scent was released without the no-scent week, earns only 1 (March 2023 report); "background noise" alone, instead of quiet and loud, earns 1 (November 2022 report).
- **Confusing design and method**: Woods et al. used a **repeated measures** design; "independent groups" or "an experiment" scores 0 (November 2022 report).
- **Mixing up Vrechopoulos et al.'s measures**: calling the most **useful** layout the "preferred" one is not credited (June 2022 report). When asked to outline the grid, just saying "grid", or giving results, is not enough (June 2023 report).
- **Mixing up studies**: describing North et al. when Guéguen et al. is asked, or saying Guéguen compared types of music (June 2023 report).
- **Woods et al. backwards**: saying salty food tastes saltier, or crunchy food seems softer, with noise (March 2025 report). Saying only "less tasty" earns 1.
- **The wrong model**: describing the PAD model when asked for the cognition-emotion model (June 2021 report), or models of personal space for ambience (November 2021 report).
- **Generic method points**: strengths and weaknesses of questionnaires or experiments that never mention odour, crowding, background noise or shoppers get little credit (March 2021, November 2021, November 2022 and March 2023 reports).
- **A summary instead of a conclusion** in 5-mark discussion questions (March 2023 and November 2022 reports).
- **Determinism**: giving a definition with no crowding example, an example from odour when crowding is asked, or defining reductionism instead (March 2026 report).
- **Plans that change the topic or explain nothing**: lighting is not store layout; "store layout" with no levels; psychological knowledge that is described but not linked to the plan; evaluation of the study in place of reasons for the plan (March 2023 and November 2021 reports).

How to get the marks

- **"Identify", "state", "give"**: short exact facts (a condition, a figure, a layout name).
- **"Outline"** (2 marks): the point plus a detail or example.
- **"Explain" or "suggest"** (2 marks a point): the point (1), applied to the study, shop or person in the question (1). Repeating the question's wording earns nothing.
- **Scenario questions**: two clearly separate suggestions; link each to a study or the PAD model; mention the scenario's goal (fewer complaints, more sales).
- **Study recall**: numbers earn marks: 393 diners, £32.51 against £29.46 and £29.73, 45–55 and 75–85 dB, 1–7 Likert items, 447 and 145 shoppers.
- **Models**: name all three PAD dimensions **and** approach or avoidance; tie them to the atmospheric asked about.
- **"Describe" essays**: every named bullet point; for a study: setting, sample, conditions, procedure, results with figures, conclusion.

- **"Evaluate"** (10 marks): issue by issue, the named issue first, each explained with evidence from (a), then a judgement.
- **"Discuss ... with a conclusion"** (5 marks): two strengths and two weaknesses, each about this topic, then a decision reached by reasoning.
- **Plans:** every feature named in the question, the IV with levels and an operationalised DV, and in (b)(ii) say exactly which feature of the study you used and how.

Quick check

1. Using North et al.'s results, how much more per person was spent in total with classical music than with pop music? Express this as a percentage of the pop-music total, to 1 decimal place.
2. North et al. ran their study on 18 evenings over 3 weeks, with three music conditions. On how many evenings was each condition used, and why did each condition appear once on each day of the week?
3. Which PAD dimension is mainly affected in each case? (a) A shopper cannot push a trolley past a display blocking the aisle. (b) Fast, loud music makes a shopper feel energised. (c) A soft scent of fresh laundry makes a shopper feel content.
4. Name the layout: (a) a main walkway loops round the store past themed rooms; (b) parallel aisles of shelving in rows; (c) displays of different shapes scattered with no set route.
5. Diners eat a crunchy chocolate biscuit in a very loud café. Using Woods et al., predict how its sweetness and crunchiness will seem compared with eating it in a quiet café.

Answers

1. $£32.51 - £29.46 = £3.05$ more per person. $\frac{3.05}{29.46} \times 100 = 10.4\%$ more.
2. $18 \div 3 = 6$ evenings each. With a Latin square, each condition fell once on each day from Monday to Saturday, so the day of the week (people spend more at weekends) could not be confounded with the music.
3. (a) **Dominance** (feeling less in control). (b) **Arousal**. (c) **Pleasure**.
4. (a) **Racetrack**. (b) **Grid**. (c) **Freeform**.
5. It will seem **less sweet** and **crunchier** in the loud café, because loud noise lowered sweetness ratings and raised crunchiness ratings.

Past questions to try

- [9990/33/M/J/25 Q5](#): changing a virtual store's racetrack layout to reduce complaints.
- [9990/32/F/M/25 Q5](#): how a noisy kitchen may change customers' perception of food.
- [9990/42/F/M/24 Q3](#): North et al.'s controls and counterbalancing.
- [9990/43/M/J/24 Q4](#): store interior layouts and the weaknesses of virtual layouts.