

Cambridge AS & A Level · Psychology 9990 · Notes

Perry et al. (personal space) AS

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What you need to know

Perry, Mankuta and Shamay-Tsoory (2015) tested whether a hormone, **oxytocin**, changes how close people are happy to let others come, and whether that depends on how **empathic** they are. It joined the syllabus in 2024, so it has only been examined in **2024 and 2025** (16 questions so far). As with every AS core study, you should be able to:

1. **Explain the psychology being investigated: interpersonal distance (personal space), social hormones** (oxytocin) and **empathy**.
2. **Give the background:** what was already known about how biology affects personal space.
3. **State the aim:** to test how oxytocin and empathy affect personal space, comparing oxytocin with a placebo.
4. **Describe the procedure and its methodology:** the sample; how oxytocin and the placebo were given; how empathy was measured with a **questionnaire**; **Experiment 1**, a computerised version of the Comfortable Interpersonal Distance Scale; and **Experiment 2**, where participants chose between pictures of rooms.
5. **Discuss the ethical issues.**
6. **Give the results** of both experiments, including how they could be shown in a graph.
7. **State the conclusions.**
8. **Evaluate every part of the study:** method, sample, controls, validity, reliability, generalisability and ethics.
9. **Relate it to the AS issues and debates** (application to everyday life, individual and situational explanations, nature versus nurture, the use of children; no animals were used).
10. **Explain why it belongs to the social approach**, using the approach's two assumptions. Exam questions also ask you to compare it with the other social core studies, Milgram and Piliavin et al.

Understand it

The psychology

Personal space (interpersonal distance) is the gap you like to keep between yourself and others. You can't see its edge, but you notice at once when someone crosses it. A close friend can stand nearer to you than a stranger before you feel uneasy, and the comfortable gap shifts from one setting to another (a crowded lift

versus an empty park). By letting some people in and keeping others out, you control how your dealings with them go.

Empathy means you can tell what someone else is going through emotionally, because you picture how their situation would feel if it were yours. It is not the same as **sympathy** (feeling sorry for someone), and a definition that only says "being empathic" earns nothing (March 2025 report).

Oxytocin (OT) is a **social hormone**: it is linked with social bonding, empathy and how much attention we pay to social signals.

Background: biology and personal space

Before this study, research had suggested that:

- **The amygdala** matters. People with damage (lesions) to the amygdala seem to need less personal space, and in healthy people, amygdala activity goes up with discomfort when someone is very close.
- **Oxytocin** changes how the amygdala responds, and it plays a part in social bonding and empathy.
- **Oxytocin's effects are not always "friendly"**. In some situations it has been linked with envy, avoiding risk or cooperating less, and it can change the distance people keep from someone they find attractive.

The **social salience** idea follows from this: oxytocin makes social cues stand out more, so what it does to a person depends on how that person already reads social situations. That is why the researchers measured empathy as well.

In a background question, don't describe what Perry et al. did or found.

The sample

Feature	Detail
Size	54 (some mark schemes also accept 40)
Sex	All male
Who	Undergraduate students at the University of Haifa
Age	19 to 32 , mean 25.29
How recruited	Volunteers , who received course credit
Screening	Normal or corrected-to-normal vision ; no history of psychiatric or neurological conditions
Handedness	5 were left-handed

Oxytocin and placebo

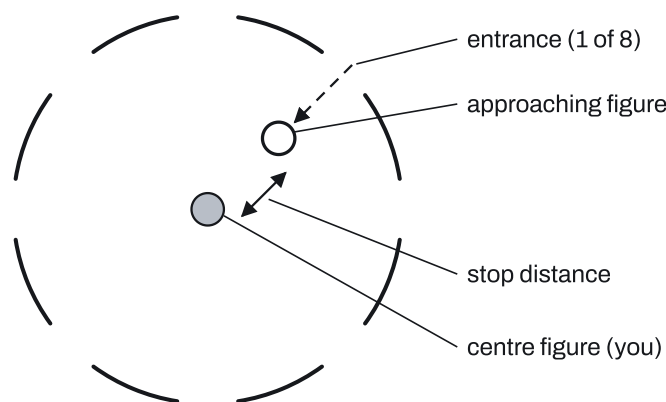
Each participant did **two conditions, one week apart**: once with oxytocin and once with a **placebo**. A placebo is something that looks like the real treatment but has no active effect; here it was **saline** (salt water), the same liquid without the hormone.

- **How the oxytocin was given:** the participant gave it to **himself, through the nose** (intranasally), with a **medicine dropper, three drops in each nostril**, a dose of **24 IU** (international units), while the **experimenter watched**.
- **Waiting:** everyone waited **45 minutes** before testing, so that oxytocin levels had levelled off.
- **Double-blind:** neither the participant nor the person testing knew which liquid had been given that day.

Measuring empathy

Participants filled in a questionnaire, the **Interpersonal Reactivity Index (IRI)**. People who scored at least **half a standard deviation above the mean** (a score of **40** or more) formed the **high-empathy** group; people at the other end of the scores formed the **low-empathy** group.

Experiment 1: the computerised distance task



The figure moves in for 3 seconds; the spacebar stops it.

On each trial:

1. The **name** of the approaching figure was shown first, then a **fixation point**.
2. A **still picture** appeared: a **circular room** with a figure at its **centre**. The participant was told to imagine being that central figure.
3. A second figure appeared at one of **eight entrances**. It was one of four kinds: a **friend**, a **stranger**, an **authority figure** (such as a boss or teacher, never a parent) or a **ball**.
4. An **animation** lasting **3 seconds** showed it moving towards the centre.
5. The participant pressed the **spacebar** as soon as he wanted it to stop. If he didn't, the trial ended when the figure **collided** with the central one.

The **dependent variable** was the **stop distance**: how far apart the two figures were when the approach stopped. A bigger stop distance means more personal space was wanted.

Experiment 2: choosing a room

Participants saw **four coloured pictures of a room**. Each picture had the same kinds of objects: a **lamp**, a **clock**, **chairs**, a **table**, a **plant** and a **closet** (cupboard). They chose between the pictures.

The deception: they were told that, at the end, they would sit and talk about **personal topics** with another participant, in an "**average**" room that a **computer** would work out from their choices. That conversation never took place: the choices were really a measure of the distance they preferred.

The independent variables and design

- **Oxytocin or placebo:** every participant did both, a week apart (**repeated measures** for this IV).
- **High or low empathy:** set by the IRI score, so each person was in only one group.
- **Experiment 1 only:** the type of approaching figure (friend, stranger, authority figure, ball).

The results

Experiment 1

- In the **high-empathy, oxytocin** condition, the **friend** was allowed closest and the **stranger** was kept furthest away: the mean stop distance was about **8.4** for a friend and about **40** for a stranger. The ball, too, was stopped nearer than the stranger.
- Overall, **friends** were allowed nearer than **strangers**.
- Oxytocin had **opposite** effects in the two groups: with oxytocin, **high-empathy** people let figures come **closer**, while **low-empathy** people wanted **more** space.

Experiment 2

- **High-empathy** participants given **oxytocin** chose rooms with **closer** distances than when they had the placebo (and than the low-empathy group).
- The low-empathy group showed the opposite trend, but it was **not significant**.
- Oxytocin made **no difference** to the average **angle** between the objects, whatever the empathy group.

A **meaningful comparison** says which condition or figure got the larger or smaller distance **than** which ("the stranger's mean stop distance was larger than the friend's"). "The friend had the smallest distance" on its own earns 1 mark.

The conclusions

- **Oxytocin changes how much personal space a person wants, but the direction depends on their empathy:** highly empathic people want others closer, less empathic people want them further away.
- **Oxytocin seems to make social cues more noticeable**, and people use that in different ways depending on their empathy (the social salience idea).
- **How familiar someone is matters:** a friend is let in closer than a stranger.

A conclusion is a general claim about people; a number or a comparison between conditions is a **result** (March 2025 report).

Ethical issues

Guideline	Ethical (for)	Not ethical (against)
Informed consent	Participants gave written consent and knew the study was about personal space and involved oxytocin	—
Protection from harm	It was only a simulation, and pressing the spacebar stopped the figure, so a participant could avoid feeling crowded	Even an animated figure moving into your space might feel stressful; and taking a hormone carries a physical risk , because individual reactions to oxytocin can't be predicted in advance
Deception	Not knowing whether they had oxytocin or placebo was justified by the design, so it doesn't count as a breach	In Experiment 2 they expected a personal conversation with a stranger that never happened; worrying about it could be stressful
Approval and debriefing	An ethics committee approved the study, and participants were debriefed	—

Two cautions from the mark schemes: the right to withdraw isn't mentioned in the paper, so don't argue about it; and a deception point against the study only scores if it is linked to **stress**.

Why it is from the social approach

The social approach has two assumptions (in plain words):

- What we **do**, **think** and **feel** is shaped by social **settings**, **environments** and **groups**.
- What we **do**, **think** and **feel** is shaped by other people being **actually there**, **implied** or just **imagined**.

Perry et al. fits the second one well: the figures were only **imagined** people on a screen, yet participants kept a stranger further off than a friend, so the imagined presence of different people changed their behaviour.

Issues and debates

- **Application to everyday life**: oxytocin might one day help people who find closeness to others hard, but the results show it would not suit everyone, since low-empathy people wanted more space with it.
- **Individual and situational**: an **individual** explanation puts the cause in the person (empathy level, hormone level); a **situational** one puts it in the surroundings (who is approaching: friend, stranger, authority figure).

- **Nature versus nurture:** **nature**, because a hormone given to the body changed personal space; **nurture**, because knowing someone well (a friend) or not (a stranger) comes from experience.
- **The use of children:** children were not used. With children the task might feel like a test and upset them, they might not understand it and treat it as a game, they might struggle with the computer, parents might worry about a hormone being given, and there were many trials, so some might drop out.

Comparing with the other social studies

Point	Perry et al.	Piliavin et al.	Milgram
Sample	54 male students at the University of Haifa, aged 19–32, volunteers for course credit	About 4450 subway passengers, men and women, opportunity sample	40 men aged 20–50 from New Haven, volunteers answering a newspaper advert, paid
Stooge	An animated figure on a screen	Students acting a collapse, taken as real	A human learner, met in person, then not seen during the procedure
Consent	Written consent	None: unaware of any study	Agreed to a different study

Key facts and formulas

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

Fact	Status
Perry et al. sample: 54 male undergraduates at the University of Haifa, aged 19–32 (mean 25.29), volunteers for course credit, normal or corrected vision, no psychiatric or neurological history, 5 left-handed	Learn it
Perry et al. oxytocin: self-given through the nose with a medicine dropper, 3 drops per nostril, 24 IU, with the experimenter present; placebo was saline; 45-minute wait; double-blind; conditions a week apart	Learn it
Perry et al. empathy groups: Interpersonal Reactivity Index; high empathy = at least half a standard deviation above the mean (a score of 40 or more)	Learn it
Perry et al. Experiment 1: circular room, figure at the centre, approaching figure from one of 8 entrances (friend, stranger, authority figure or ball), 3-second animation, spacebar to stop or the trial ends on collision; DV = stop distance	Learn it
Perry et al. results: high empathy with oxytocin let figures closer, low empathy wanted more space; friend about 8.4 and stranger about 40 (high empathy, oxytocin)	Learn it

How to do it

We have tagged 16 questions on this study, all from 2024 and 2025 (Papers 1 and 2). 9 of them have parts of more than one type, so the counts add up to 29.

Question type	Questions
Describe the procedure	6
Ethics	6
Results and conclusions	4
Evaluation and research methods applied to Perry	4
The psychology and background	3
Describe the sample	2
Compare with another social study	2
Social approach and issues and debates	2

1. Describe the procedure (6 questions)

One mark per correct fact, and these lists are usually **definitive**: only facts from the study score. Stay inside the start and end points the question gives (a detail printed in the question, such as the fixation point, earns nothing).

- **One Experiment 1 trial** (4 marks): still picture; circular room; figure at the centre; imagine being that figure; an approaching figure; from one of eight entrances; one example such as a stranger (only one example scores); a 3-second animation; spacebar to stop it, or the trial ended when they collided.
- **How the test could end** (2 marks): the participant pressed the spacebar; or the figures collided (the figure reached the centre after 3 seconds). "When the participant stops the figure" is too vague.
- **How oxytocin was received** (3 marks): self-given; through the nose; medicine dropper; three drops per nostril; 24 IU; with the experimenter present. **The other condition** (1 mark): saline. Not a "placebo pill" or "injection".
- **The approaching figures**: friend, stranger, authority figure (boss, teacher), ball. Not a parent, and don't repeat a figure the question has already given.
- **The room pictures** (1 mark): chair, table, plant or closet, besides any the question names.
- **The high-empathy group** (2 marks): the IRI; at least half a standard deviation above the mean (40 or more). "An empathy test" alone scores 0.

2. Ethics (6 questions)

Each point is a **guideline** (1) plus **evidence** from the study (1). See the table under "Ethical issues".

- **Two friends disagree** (4 marks): for "ethical", use written consent, ethics-committee approval, the simulation and the spacebar; for "not ethical", use the stressful Experiment 2 deception, the stress of an approaching figure, and the risk from oxytocin. If both friends are asked for, give one reason each and don't use the same guideline twice.
- **How participants were deceived in Experiment 2** (2 marks, definitive list): they were told that at the end they would discuss personal topics with another participant (1); this would take place in an "average" room worked out by a computer (1); neither was true, as the choices really measured preferred distance (1). Not knowing whether they had oxytocin or placebo scores 0.
- **One ethical weakness** (2 marks): protection from harm (the figure coming closer, or the promised personal conversation, might cause stress), or deception linked to stress.
- **An ethical strength of the virtual room or imagined people** (2 marks): less risk of harm or of invading privacy than real people coming close (1), because if it gets uncomfortable you can stop the figure, which you can't easily do with a real person (1). Imagined people also need less deception, since participants are simply told what to imagine.
- **Don't score**: "not knowing whether they had oxytocin" as deception; "not debriefed"; "no informed consent"; the right to withdraw.

3. Results and conclusions (4 questions)

1. **Check exactly which result** is asked for: which experiment, which empathy group, which condition. A comparison with the placebo or low-empathy group scores nothing when the question asks about two figures in one condition.
 2. **Make a meaningful comparison** for 2 marks: larger or smaller, **than** what.
 3. **Add data** when asked: friend about 8.4, stranger about 40 (high empathy, oxytocin).
- **Experiment 2 and oxytocin** (2 marks): high-empathy participants given oxytocin chose closer distances than with the placebo. You **must** mention the empathy group: "people given oxytocin chose closer distances" is wrong, because low-empathy people went the other way.
 - **A conclusion** (2 marks): a general claim that **includes oxytocin's role**, such as "oxytocin's effect on personal space depends on how empathic a person is". "People with high empathy need less personal space" is only 1.
 - **A conclusion from a table of means** (1 mark): a general statement, such as "people allow friends closer than strangers".

4. Evaluation and research methods applied to Perry (4 questions)

Identify the point (1), then **explain** it with a Perry example (1).

- **Strengths: controls** (the 45-minute wait, so it was the hormone and empathy affecting distance); **standardised** procedure, so it can be **replicated** (every figure approached for 3 seconds); **double-blind**, so fewer **demand characteristics**.

- **Weakness of the animations** (must be about the animations): low **ecological validity** (or **mundane realism**): in daily life, nobody watches a cartoon figure glide towards them across a screen; or not a **valid** measure: a flesh-and-blood person stepping close might make someone feel and act quite differently from a drawing doing the same.
- **Stooges versus imagined people**: stooges can be more practical, since a trained stooge follows a script, so each participant meets an identical approach, while the person one participant pictures may be nothing like another's (**control**); and a real person approaching gives more **natural** reactions.
- **Bar chart** (if given a table of mean stop distances): x-axis "type of approaching figure" with the four figures; y-axis "mean stop distance"; separate bars. A **bar chart** suits the data because the figures are **categories** (the data are not continuous).

5. The psychology and background (3 questions)

- **Personal space** (2 marks): a gap or boundary around a person that others can't see (1), plus one more idea: we control who comes inside it, the size changes with the setting, or it steers how we interact (1). At most 1 mark for a Perry example.
- **Empathy** (2 marks): two parts, *what* it is and *how* it works. What: being able to grasp another person's feelings (1). How: you picture what their situation would be like for you (1).
- **Biological factors** (3 marks, one per point): oxytocin's part in social bonding and empathy; amygdala lesions and less need for space; amygdala activity and discomfort at close range; oxytocin changing amygdala activity; oxytocin's less friendly effects (envy, risk aversion, less cooperation); its effect on distance from an attractive person. Nothing about the procedure or findings.

6. Describe the sample (2 questions)

One mark per fact: 54 (or 40); male; undergraduates; University of Haifa; aged 19–32 or mean 25.29; volunteers for course credit; normal or corrected vision; no psychiatric or neurological history; 5 left-handed. When asked to **state the number**, give one number only.

7. Compare with another social study (2 questions)

Each difference is marked in levels out of 4: Level 4 states the difference **and** explains it with an example from **both** studies. Good differences: the **stooge** (animated figure versus a human), the **sample** (who, how many, where from: give real facts for both; a sampling technique alone doesn't count as the sample), and **ethics** (Perry's written consent and spacebar against Milgram's deception and distress; name the guideline).

8. Social approach and issues and debates (2 questions)

- **Two assumptions** (2 marks each): name **two** of behaviour, cognitions and emotions **and** what influences them. "Affected by social factors" is too vague.
- **A finding that supports an assumption** (2 marks): a result (1) plus an explicit link (1). For example, the imagined stranger was kept further away than the imagined friend, so the imagined presence of different people changed behaviour.

- **Problems using children** (2 marks each): a general problem (1) linked to Perry (1); see "Issues and debates". "You can't generalise to adults" doesn't count.

Worked examples

Example 1

From the study by Perry et al. (personal space), explain why the researchers measured empathy rather than only comparing oxytocin with a placebo. [2]

Earlier research suggested oxytocin makes social cues stand out more, so its effect could depend on how a person already reads others, rather than being the same for everyone (1). By splitting participants into high- and low-empathy groups with the IRI, they could see that oxytocin moved the two groups in opposite directions, which an overall average would have hidden (1).

Example 2

Explain one strength of each participant taking part in both the oxytocin and the placebo conditions in the study by Perry et al. [2]

It is a **repeated measures** design for this variable, so **participant variables** are controlled (1). The same man's stop distances with oxytocin and with saline are compared, so a difference can't be due to one group simply happening to like more space than the other (1).

Example 3

Explain how the study by Perry et al. (personal space) can be used to support both sides of the nature versus nurture debate. [4]

Nature means behaviour comes from inherited or biological factors (1). A hormone, oxytocin, changed how close people let figures come, so a biological factor affected personal space (1).

Nurture means behaviour comes from experience and the environment (1). Friends were allowed nearer than strangers, and knowing a person well is something we learn through experience, so learning shapes personal space too (1).

Example 4

A researcher wants to repeat Experiment 1 from the study by Perry et al. with higher ecological validity.

Suggest one change she could make, and explain one problem the change might cause. [4]

Change: instead of an animation, a real person (a stooge) could walk slowly towards the participant in a real room (1), and the participant says "stop" when the person feels too close, with the gap measured by tape (1). This is closer to how personal space is invaded in daily life.

Problem: it is less ethical, since a real person coming close can't be stopped as easily as an animated figure and may cause more stress (**1**); the stooge's speed and expression may also vary from trial to trial, so the procedure is less standardised than a 3-second animation (**1**).

Common mistakes

- **Giving "parent" as an approaching figure**, or repeating the one printed in the question (March 2025 report).
- **Defining empathy with itself** ("being empathic"), or confusing **empathy** with **sympathy** (March 2025 report).
- **Giving a result when a conclusion is asked for**: a conclusion is the general meaning, not the data (March 2025 report).
- **Not knowing the study well enough**: the March 2025 report names Perry et al. as a study where gaps in knowledge cost marks, above all on questions about the validity of a method.
- **Leaving out the empathy group** in an oxytocin result: oxytocin did not bring everyone closer (mark schemes).
- **Calling "not knowing which liquid they had" deception**: it scores nothing (mark schemes).
- **General weaknesses when the question is about the animations**, or "you can't generalise to adults" for using children (mark schemes).

How to get the marks

- **"State" or "identify"**: one short exact answer (54; saline; the stranger). Only the first answer is marked.
- **"Describe the procedure"**: one specific fact per mark from the right part of the study, inside the start and end points given.
- **"Outline one result"**: a comparison (larger or smaller **than** what) for 2 marks, plus data when asked.
- **"Outline one conclusion"**: a general claim; include oxytocin's role for full marks.
- **"Explain"** a strength, weakness or ethical point: name it (1), then give the Perry example (1).
- **Two friends**: name the guideline, then give the Perry evidence for each side.
- **Differences with another study** (4 marks each): state the difference and use **both** studies.

Quick check

1. In Experiment 1, what did a participant do to make the approaching figure stop?
2. The participants' ages ran from 19 to 32. What was the range of their ages?
3. 5 of the 54 participants were left-handed. What percentage is that, to 1 decimal place?
4. Is this a result or a conclusion: "Oxytocin makes highly empathic people more willing to let others come close"?

5. In the high-empathy oxytocin condition, a stranger was stopped at about 40 and a friend at about 8.4.
Roughly how many times further away was the stranger stopped?

Answers

1. He pressed the **spacebar**.
2. $32 - 19 = 13$ years.
3. $\frac{5}{54} \times 100 = 9.259 \dots$, so **9.3%**.
4. A **conclusion**: it is a general claim about people, not a measured value from the study.
5. $40 \div 8.4 = 4.76 \dots$, so the stranger was stopped nearly **5 times** as far away.

Past questions to try

- [9990/13/M/J/24 Q1](#): the number of participants, defining personal space, and the high-empathy group.
- [9990/11/O/N/24 Q6](#): how oxytocin was given, the other condition and a strength.
- [9990/11/M/J/25 Q2](#): how the computer task could end, then an ethical weakness.
- [9990/12/F/M/25 Q1](#): an approaching figure, defining empathy and a conclusion.