

Developing a tool for teachers to increase awareness and understanding of Autism

Ashley Peacock

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Contents

0.1 Introduction	1
Appendices	2
A Appendix	3
B Summative	4
B.1 Summative materials	5
C Prototype implementation	10
C.1 HouseScene: Code	10
D First version	12
D.1 Rewrite of scene manager	12
D.1.1 HomeScene: Code	12

0.1 Introduction

test Matson and Kozlowski [2011], Mayes et al. [2013] , Gabriels et al. [2008]

Appendices

Appendix A

Appendix

Appendix B

Summative

B.1 Summative materials

Background Questionnaire

Participant code:

Age.....

Gender.....

What course are you enrolled on?

Year of study.....

What courses have you completed in Inclusive or Special Education? Please state:

.....

Please rate how much you agree or disagree with the following statements:
where 1 = strongly agree, 2 = agree, 3 = not sure, 4 = disagree, 5 = strongly disagree.

	1	2	3	4	5
I have a good knowledge of autism					
I am confident in managing children with autism in the classroom					
I have had direct experience of working with children with autism					
I have received autism-specific training					

Please rate how much you agree or disagree with the following statements:
where 1 = strongly agree, 2 = agree, 3 = not sure, 4 = disagree, 5 = strongly disagree.

	1	2	3	4	5
I am a skilled computer user					
I play a lot of video games					
I prefer to learn through my own experience rather than from theory					
I think technology has a lot to offer to education					

Vignette A

Participant code: : Seen 1st or 2nd?

Johnny is eleven years old and has autism. He is in your mainstream class and today you are working on fractions. It is a lovely sunny day and outside someone is mowing the football pitch. Johnny normally enjoys maths but today he is fidgety and restless. When you ask him why he doesn't respond. Eventually he jumps up and leave the classroom without asking permission.

What do you do? - please select no more than three options from the list below:

- ☐ Ask the children sitting near Johnny to go and bring him back in
- ☐ Set Johnny extra maths homework to make up for the lessons he missed
- ☐ Close the classroom windows
- ☐ Find Johnny and ask him what is wrong
- ☐ Call Johnny's parents and find out what he ate for breakfast
- ☐ Send Johnny to the Headmaster for punishment
- ☐ Offer Johnny a chance to work on his own
- ☐ Make Johnny stay inside over lunch to catch up
- ☐ Go outside and ask the gardener to stop mowing the lawn
- ☐ Send Johnny to the guidance counsellor
- ☐ Find Johnny and give him a hug

Figure B.2: Vignette A

Vignette B

Participant code: Seen 1st or 2nd?

Emily is nine years old and has autism. She is in your mainstream class and today they are doing group projects on using money. Emily's group are annoyed that she keeps taking the coins they are working with and spinning them, and they come to you to complain.

What do you do? - please select no more than three options from the list below:

- ☐ Tell the children to work it out between themselves
- ☐ Send Emily outside for disrupting the class
- ☐ Explain to Emily that the spinning is making it difficult for her group
- ☐ Ask Emily why she is spinning the coins
- ☐ Call Emily's parents and ask them whether she gets any pocket money
- ☐ Tell Emily to stop spinning the coins and focus on her work
- ☐ Offer Emily a chance to work on her own
- ☐ Take all the coins away from that group
- ☐ Give Emily something else she can spin
- ☐ Send Emily to the guidance counsellor
- ☐ Tell the other children not to bother Emily because she is special

Figure B.3: Vignette B

Autism World Consent Form

Now that you have read the information sheet, and asked questions, it is up to you to decide whether you want to take part in my study. You are free to withdraw at any time, without giving a reason.

If you are happy to take part in this project, please complete the consent form below by circling the appropriate response to each item:

- | | | |
|---|-----|--------|
| 1. I am willing to take part in the Autism simulator study | Yes | No |
| 2. I am happy to be contacted later for additional feedback | Yes | No |
| 3. I understand that all my comments will be recorded anonymously | Yes | No |
| 4. I understand that if I wish to withdraw at any time I can do so | Yes | No |
| 5. I am happy for my details to be retained so I can be contacted about new research projects in the future | Yes | No |
| 6. I have had all my questions about the study answered | N/A | Yes No |

Name: [please print clearly]

Signature: Date:

Phone number*

Email address*:

Researcher:

Name: Ashley Peacock

Signature: Date:

*These contact details will allow me to reach you as the study progresses, and will also, with your permission, (see item 6 above) be entered into on a secure database so we can contact you again

Figure B.4: Vignette B

Autism World: Info Sheet for Participants

I would like to invite you to take part in a software development project. Before you decide you need to understand why the research is being done and what taking part would involve. Please take time to read the following information carefully. Ask me if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

About me:

I am a 5th year student at Edinburgh University studying Informatics and have a strong interest in neurological conditions, specifically Autism. For my final year project I am going to create a new piece of software to help parents and carers, and professionals who work with people with autism spectrum conditions.

About the project:

The software is a virtual environment where the user plays the role of someone with autism and gets to experience some aspects of the world through the autistic person's eyes.

The game player will move through a virtual house, trying to complete everyday tasks, like getting a glass of juice or completing a routine. On the way round, you will face challenges and obstacles and if not addressed quick enough, this can lead to a meltdown. The key aim is for the player to get a visual understanding of some aspects of what it may be like to have autism.

There are two different modes of the game, "Explore mode" and "Mission mode". In explore mode the user will become more familiar with the environment and and acquire more factual information on some of the obstacles faced. The "Mission mode" is a chance to put what you have learnt to the test by completing tasks and overcoming difficulties described by someone with autism.

Your role:

Your role will be to come in and fill out a short questionnaire, play the "Explore mode" until you feel comfortable within the environment and then proceed to the "Mission mode" before filling out a final short questionnaire.

Please let me know if you have any questions.

Ashley Peacock
S0936300@sms.ed.ac.uk
07951919756

Figure B.5: Vignette B

Appendix C

Prototype implementation

C.1 HouseScene: Code

```
public class HouseScene extends SceneManager {

    public HouseScene(String houseScene, Main app) {
        super(houseScene, app);
    }

    @Override
    public void setupModels() {
        setupLights();
        setupDoors();
        setupDescriptions();
    }

    public void setupLights() {
        Iterator it = models.keySet().iterator();
        while (it.hasNext()) {
            String key = it.next().toString();
            if (key.contains("lamp")) {
                Spatial node = models.get(key);
                addLampLight(node);
                node.setUserData("state", true);
                node.setUserData("sensory", "lamp");
                System.out.println("Added light to " + key);
                Main.getSensoryManager().addSensoryObject(node, "light
                ");
            }
        }
    }
}
```

```

}

public void setupDescriptions() {
    addDescription("fridge", "This is a fridge and it smells");
    addDescription("fryingpan", "Urg, the smell of this is
        overpowering");
    addDescription("wardrobe", "Certain clothes can be very
        uncomfortable for someone with Autism. One person describes"
        + "it as like wearing sand paper, and clothes labels
        feeling like sandpaper");
    addDescription("tv", "TV Adverts: Parents be warned. If you buy
        a toy from an advert and it doesn't do"
        + "exactly what the advert says, your child may be
        quite surprised and upset. Similarly, things on TV "
        + "can be taken very literally and a child with autism
        may not know they what they see is not real.");
}

public void setupDoors() {
    Iterator it = models.keySet().iterator();
    while (it.hasNext()) {
        String key = it.next().toString();
        if (!key.contains("door"))
            continue;

        Node door = (Node) models.get(key);
        if (door.getName().contains("door")) {
            DoorControl dc = new DoorControl();
            door.addControl(dc);
        }
    }
}

@Override
public void setupMaterials() {
    Material m = new Material(am, "Common/MatDefs/Misc/Unshaded.
        j3md");
    MaterialsManager.addMaterial("unshaded", m);
}
}

```

Appendix D

First version

D.1 Rewrite of scene manager

D.1.1 HomeScene: Code

```
package mygame.scene.scenes;

/**
 * Contains all the information for the home scene.
 * @author Ashley
 */
public class HomeScene extends SceneManager implements
    GameActionListener {
    Scene kitchen;
    Scene livingroom;
    Scene bedroom;
    Scene bathroom;
    Scene hallway;

    AssetManager am = null;
    Main app;

    /** Bedroom sensory objects */
    SensoryObject bedroom_alarmSO;
    LightSensoryObject bedroom_lampSO;
    LightSensoryObject bedroom_ceilingSO;

    /** Bathroom objects */
    SensoryObject bathroom_toiletSO;
    SensoryObject bathroom_toothBrushSO; // this is a cup atm, change
        to toothrbush when I get one.
```

```

SensoryObject bathroom_ceilingLampSO;

/** Hallway objects */
LightSensoryObject hallwayLampSO;
LightSensoryObject hallwayCeilingSO;

/** Kitchen objects */
LightSensoryObject kitchenCeilingSO;
SensoryObject washingMachineSO;
AudioNode drinkWater = new AudioNode();
LightSensoryObject fLightSO;

/** Livingroom objects */
LightSensoryObject livingroomFloorLampSO;
LightSensoryObject livingroomCeilingSO;
SensoryObject livingroomHooverSO;

public HomeScene(Main app) {
    super(app);

    this.am = app.getAssetManager();
    this.app = app;

    bedroom = new Scene("bedroom", app);
    bedroom.setSceneLoadPoint(new Vector3f(3.9f, 0.45f, 4.2f), new
        Vector3f(-0.99f, -0.03f, -0.04f));
    bedroom.setScale(3f);
    bedroom.assignSpatialActions("wardrobe", "dressed");
    bedroom.assignSpatialThought("routine", "Routines make me feel
        safer!");
    bedroom.addDescription("routine", "People with autism often
        have a desire for a strict routine. One minute off can throw
        them off.");

    bathroom = new Scene("bathroom", app);
    bathroom.setSceneLoadPoint(new Vector3f(0.844f, 2.1f, -6.54f),
        new Vector3f(-0.01f, 0.04f, 0.99f));
    bathroom.setScale(4f);

    livingroom = new Scene("livingroom", app);
    livingroom.setSceneLoadPoint(new Vector3f(5, 4, 5), new
        Vector3f(-0.14f, -0.013f, -0.99f));
    livingroom.assignSpatialActions("mill.001", "play");
    livingroom.assignSpatialActions("mill.002", "play");

```

```

livingroom.assignSpatialActions("millbase", "play");

livingroom.addDescription("lightening_poster", "Thunderstorms
    was one of the top listed 'Unusual fears' for children with
    Autism. During interviews, two people with autism explained
    they could literally feel the air change before a storm. "
    + "This caused stressed for one and excitement for
    another. Sensory problems in Autism are unique for
    each individual");

hallway = new Scene("hallway", app);
hallway.setSceneLoadPoint(new Vector3f(-9.09f, 2.04f, 5.99f),
    new Vector3f(-0.99f, -0.37f, 0.02f));
hallway.setScale(3f);

kitchen = new Scene("kitchen", app);
kitchen.setSceneLoadPoint(new Vector3f(7.42f, 1.25f, 2.36f),
    new Vector3f(0.02f, -0.05f, -0.99f));
kitchen.setScale(2f);

kitchen.assignSpatialActions("Fridge", "food");
kitchen.assignSpatialActions("cheese", "food");
kitchen.assignSpatialActions("grapes", "food");
kitchen.assignSpatialActions("turkeyleg", "food");
kitchen.assignSpatialActions("foodinbowl", "food");
kitchen.assignSpatialActions("lamp", "sensory");

setMeltdownRespawn(bedroom);
loadScene(bedroom);
addGameActionListener(this);
setupSensoryObjects();
addHouseDescriptions();
}

public void addHouseDescriptions() {
    bedroom.assignSpatialThought("dinosaur", "Play with me");
    bedroom.assignSpatialThought("wardrobe", "Certain clothes
        can be very uncomfortable for someone with Autism. One
        person describes "
        + "them as like wearing sand paper, and the labels
        on them feeling like barbed wire.");
    bedroom.assignSpatialThought("ceilinglamp", "Some of these
        lights hurt my eyes");
}

```

```

        livingroom.assignSpatialThought("tv", "Wow. I want a
            dinosaur as big as on TV! Can't wait to get him for
            christmas");
        livingroom.addDescription("tv", "Literal interpretation:
            children with autism tend to interpret information
            literally. If they recieve a toy seen on TV they may not
            realise it does not behave in the same way. i.e toy Buzz
            Lightyear won't fly in real life!");
        livingroom.assignSpatialThought("mill.001", "Oh oh oh. I
            like this!");
        livingroom.assignSpatialThought("mill.002", "Oh oh oh. I
            like this!");
        livingroom.assignSpatialThought("millbase", "Oh oh oh. I
            like this!");
    }

    /**
     * Handles all the object actions of the scene.
     * @param gae
     * @return
     */
    public boolean notify(GameActionEvent gae) {
        String currentSceneName = currentScene.getName();
        String actionSpatial = gae.getSpatial().getName();
        Spatial actionParentSpatial = gae.getSpatial().getParent();

        // this may cause problems because it's getting the second
        // level of nodes rather than
        // finding them.
        //System.out.println("Acted on spatial " + actionSpatial + " in
            room " + currentSceneName + ", ");

        if(currentSceneName.equals("kitchen")) {
            if(actionSpatial.contains("door")) {
                hallway.setSceneLoadPoint(new Vector3f(-5.18f, 2.04f,
                    6.9f), new Vector3f(-0.014f, -0.03f, -0.99f));
                changeScene(hallway);
            } else if(actionSpatial.contains("switch")) {
                kitchenCeilingSO.doAction();
                fLightSO.doAction();
            }
            //System.out.println("Action spatial " + actionSpatial);
        } else if(currentSceneName.equals("livingroom")) {
            if(actionSpatial.contains("door")) {

```



```

        hallway.setSceneLoadPoint(new Vector3f(3.32f, 1.9f,
            -4.2f), new Vector3f(-0.01f, -0.03f, 0.99f));
        changeScene(hallway);
    } else if (actionSpatial.contains("switch")) {
        livingroomCeilingSO.doAction();
    }
} else if (currentSceneName.equals("bathroom")) {
    if (actionSpatial.equals("door")) {
        hallway.setSceneLoadPoint(new Vector3f(12.7f, 2.01f,
            4.2f), new Vector3f(0.216f, -0.03f, 0.976f));
        changeScene(hallway);
    } else if (actionSpatial.contains("toilet")) {
        bathroom_toiletSO.doAction();
    } else if (actionSpatial.contains("switch")) {
        bathroom_ceilingLampSO.doAction();
    }
}

} else if (currentSceneName.equals("bedroom")) {
    if (actionSpatial.equals("door")) {
        hallway.setSceneLoadPoint(new Vector3f(21.9f, 1.9f,
            5.7f), new Vector3f(-0.99f, -0.37f, 0.02f));
        changeScene(hallway);
    } else if (actionSpatial.contains("clock") ||
        actionParentSpatial.getName().contains("clock")) {
        System.out.println("Acting on clock");
        bedroom_alarmSO.doAction();
    }
}

    if (actionSpatial.contains("switch")) {
        bedroom_ceilingSO.doAction();
    }
}

} else if (currentSceneName.equals("hallway")) {
    if (actionSpatial.contains("door")) {
        String actionSpatialID = actionParentSpatial.getParent
            ().getName();
        System.out.println("Action ID spatial is " +
            actionSpatialID);
        if (actionSpatialID.contains("living"))
            changeScene(livingroom);
        else if (actionSpatialID.contains("kitchen")) {
            changeScene(kitchen);
        } else if (actionSpatialID.contains("bath")) {
            changeScene(bathroom);
        } else if (actionSpatialID.contains("bedr")) {

```

```

        changeScene(bedroom);
    }
}

if(actionSpatial.contains("switch")) {
    // this helps deal with differing linked objects
    String actionSpatialID = gae.getSpatial().getParent().
        getParent().getName();
    if(actionSpatialID.contains("lam")) {
        if(hallwayLampSO == null) {
        } else {
            hallwayLampSO.doAction();
        }
    } else { // it's just the normal switch. Two switches
        in the room so need to differentiate.
        hallwayCeilingSO.doAction();
    }
} else if(actionSpatial.contains("tap")) {
    MainGameAppState.getMyPlayer().eat(null);
}

}
return false;
}

/**
 * Sets up all sensory objects in the scene and assigns their
 * properties.
 */
public void setupSensoryObjects() {
    // ***** Livingroom sensory objects *****/
    Spatial floorLamp = livingroom.getSpatial("Floor lamp");
    if(floorLamp != null) {
        livingroomFloorLampSO = new LightSensoryObject(floorLamp, "
            Inside screen2", null, MaterialsManager.getMaterial("
            transparent"), LightType.STANDARD);
        livingroomFloorLampSO.setUpperLevel(SensoryObject.
            SensoryState.LOW);
        livingroom.addSensoryObject(livingroomFloorLampSO);
        livingroom.addLampLight(floorLamp);
        livingroomFloorLampSO.setLight(true);
    }
}

```

```

Spatial livingroomCeilingLamp = livingroom.getSpatial("
    ceilinglamp");
if(livingroomCeilingLamp != null) {
    livingroomCeilingSO = new LightSensoryObject(
        livingroomCeilingLamp, LightType.STANDARD);
    livingroomCeilingSO.setUpperLevel(SensoryObject.
        SensoryState.LOW);
    livingroom.addSensoryObject(livingroomCeilingSO);
    livingroom.addLampLight(livingroomCeilingLamp);
}

Spatial hoover = livingroom.getSpatial("hoover");
if(hoover != null) {
    livingroomHooverSO = new SensoryObject(hoover, false,
        SensoryObject.SensoryType.SOUND_SWITCH, SensoryObject.
        SensoryState.NONE);
    livingroomHooverSO.setUpperLevel(SensoryObject.SensoryState
        .HIGH);
    AudioNode hooverNoise = new AudioNode(am, "Sounds/vax.ogg",
        false);
    livingroomHooverSO.addSound(hooverNoise, (Node) hoover);
    livingroom.addSensoryObject(livingroomHooverSO);
}

// ***** Bedroom object setup *****/
Spatial alarmClock = bedroom.getSpatial("clockface");
if(alarmClock != null) {
    bedroom_alarmSO = new SensoryObject(alarmClock, false,
        SensoryObject.SensoryType.SOUND_TEMP, SensoryObject.
        SensoryState.NONE);
    bedroom_alarmSO.setUpperLevel(SensoryObject.SensoryState.
        HIGH);
    AudioNode bell = new AudioNode(am, "Sounds/bell.ogg", false
    );
    bedroom_alarmSO.addSound(bell, (Node) alarmClock);
    bedroom.addSensoryObject(bedroom_alarmSO);

    // not the best way to get around the spatial having
    // seperate parts.
    // this assigns it type sensory so it will fire through the
    // action manager.
    // and we can handle it within this class.
    bedroom.assignSpatialActions("clock_body", "sensory");
}

```

```

Spatial bedroomLamp = bedroom.getSpatial("lamp");
if (bedroomLamp != null) {
    bedroom_lampSO = new LightSensoryObject (bedroomLamp,
        LightType.STANDARD);
    bedroom_lampSO.setUpperLevel (SensoryObject.SensoryState.
        NONE);
    bedroom.addSensoryObject (bedroom_lampSO);
    bedroom.addLampLight (bedroomLamp);
}

Spatial bedroomCeilingLamp = bedroom.getSpatial("ceilinglamp");
if (bedroomCeilingLamp != null) {
    bedroom_ceilingSO = new LightSensoryObject (
        bedroomCeilingLamp, LightType.STANDARD);
    bedroom_ceilingSO.setUpperLevel (SensoryObject.SensoryState.
        LOW);
    bedroom.addSensoryObject (bedroom_lampSO);
    bedroom.addLampLight (bedroomCeilingLamp);
}

// ***** Bathroom setup *****/
Spatial toilet = bathroom.getSpatial("toilet");
if (toilet != null) {
    AudioNode flush = new AudioNode(am, "Sounds/toilet.ogg",
        false);
    bathroom_toiletSO = new SensoryObject (toilet, false,
        SensoryObject.SensoryType.SOUND_TEMP, SensoryObject.
        SensoryState.NONE);
    bathroom_toiletSO.setUpperLevel (SensoryObject.SensoryState.
        HIGH);
    bathroom_toiletSO.addSound (flush, (Node)toilet);
    bathroom.addSensoryObject (bathroom_toiletSO);
}

Spatial toothbrush = bathroom.getSpatial("toothbrush");
if (toothbrush != null) {
    bathroom_toothBrushSO = new SensoryObject (toothbrush, false
        , SensoryObject.SensoryType.SOUND_TEMP, SensoryObject.
        SensoryState.NONE);
    bathroom_toothBrushSO.setUpperLevel (SensoryObject.
        SensoryState.MED);
    bathroom_toothBrushSO.addSound (new AudioNode (am, "Sounds/
        brushteeth.ogg", false), (Node)toothbrush);
}

```

```

        bathroom.addSensoryObject(bathroom_toothBrushSO);
    }

    Spatial bathroomCeilingLamp = bathroom.getSpatial("ceilinglamp");
    if(bathroomCeilingLamp != null) {
        bathroom_ceilingLampSO = new LightSensoryObject(
            bathroomCeilingLamp, LightType.STANDARD);
        bathroom.addSensoryObject(bathroom_ceilingLampSO);
        bathroom.addLampLight(bathroomCeilingLamp);
    }

    // ***** Hallway *****/
    Spatial hallwayLamp = hallway.getSpatial("lamp");
    if(hallwayLamp != null) {
        hallwayLampSO = new LightSensoryObject(hallwayLamp,
            LightType.STANDARD);
        hallwayLampSO.setUpperLevel(SensoryObject.SensoryState.HIGH);
        hallway.addSensoryObject(hallwayLampSO);
        hallway.addLampLight(hallwayLamp);
        hallwayLampSO.setLight(false);
    }

    Spatial hallwayCeilingLamp = hallway.getSpatial("ceilinglamp");
    if(hallwayCeilingLamp != null) {
        hallwayCeilingSO = new LightSensoryObject(
            hallwayCeilingLamp, LightType.STANDARD);
        hallwayCeilingSO.setUpperLevel(SensoryObject.SensoryState.LOW);
        hallway.addSensoryObject(hallwayCeilingSO);
        hallway.addLampLight(hallwayCeilingLamp);
    }

    // ***** Kitchen *****/
    Spatial kitchenCeilingLamp = kitchen.getSpatial("ceilinglamp");
    if(hallwayCeilingLamp != null) {
        kitchenCeilingSO = new LightSensoryObject(
            kitchenCeilingLamp, LightType.STANDARD);
        kitchenCeilingSO.setUpperLevel(SensoryObject.SensoryState.NONE);
        kitchen.addSensoryObject(kitchenCeilingSO);
        kitchen.addLampLight(kitchenCeilingLamp);
    }

```

```

    Spatial washingMachine = kitchen.getSpatial("Washer");
    if(washingMachine != null) {
        washingMachineSO = new SensoryObject(washingMachine, false,
            SensoryObject.SensoryType.SOUND.SWITCH, SensoryObject.
            SensoryState.NONE);
        washingMachineSO.setUpperLevel(SensoryObject.SensoryState.
            MED);
        AudioNode wash = new AudioNode(am, "Sounds/washingmachine.
            ogg", false);
        washingMachineSO.addSound(wash, (Node) washingMachine);
        kitchen.addSensoryObject(washingMachineSO);
    }

    Spatial fluLight = kitchen.getSpatial("flurescentlight");
    if(fluLight != null) {
        fLightSO = new LightSensoryObject(fluLight, LightType.
            FLIGHT);
        fLightSO.setUpperLevel(SensoryObject.SensoryState.MED);
        kitchen.addSensoryObject(fLightSO);
        kitchen.addLampLight(fluLight);
    }

}

public ArrayList<GameActionEvent> getCustomGameActionEvents() {
    ArrayList<GameActionEvent> gameActions = new ArrayList<
        GameActionEvent>();
    return gameActions;
}

}

```

Bibliography

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