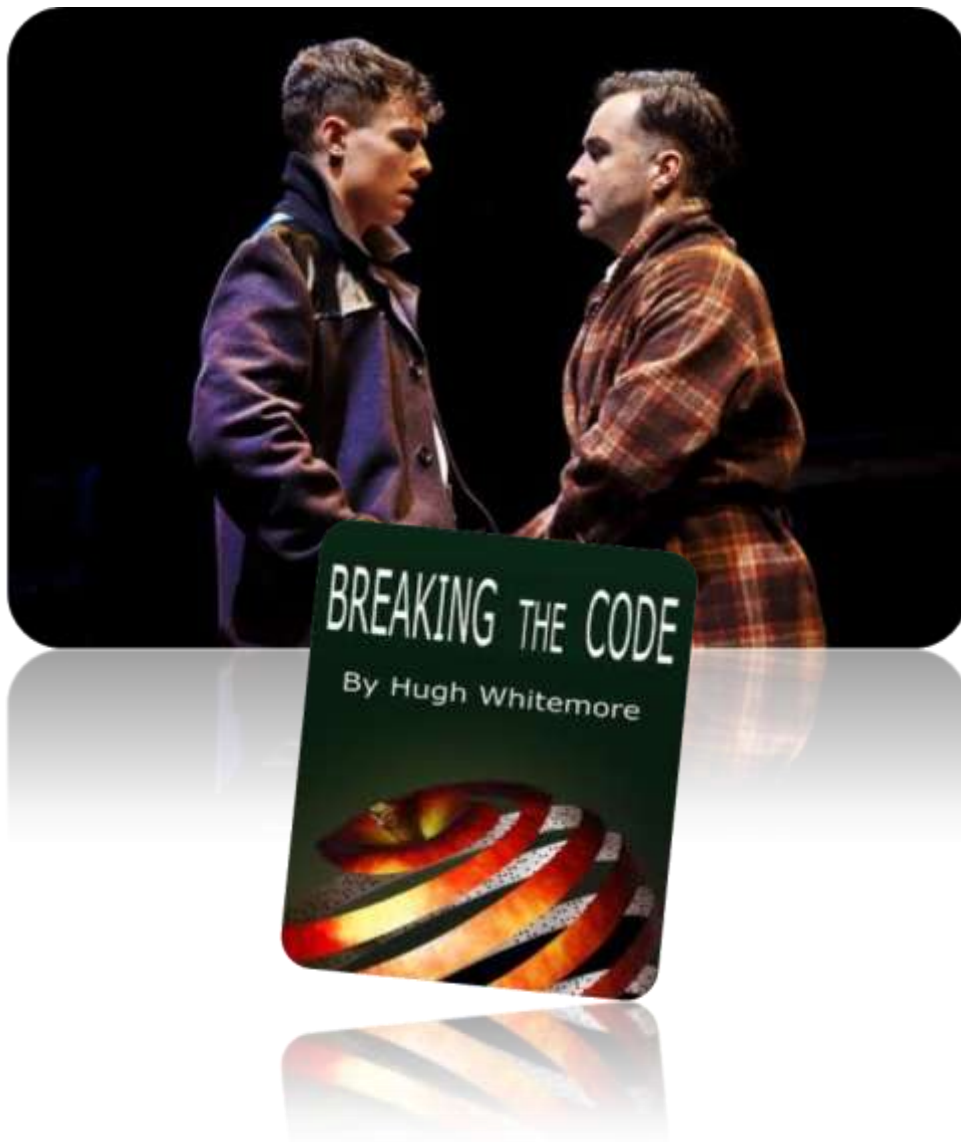


“...any play that can make mathematics sexy definitely gets my vote”.

Lyn Gardner, The Guardian



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Lea Dunbar, Karl Guttzeit, Michael Gonszar

1 Alan Turing (1912-1954). The Man and His Work



1.1 Biography Alan Turing was born on 23 June, 1912, in London. His father was in the Indian Civil Service and Turing's parents lived in India until his father's retirement in 1926. Turing and his brother stayed with friends and relatives in England. Turing studied mathematics at Cambridge University, and subsequently taught there, working in the burgeoning world of quantum mechanics. It was at Cambridge that he developed the proof which states that automatic computation cannot solve all mathematical problems. This concept, also known as the Turing machine, is considered the basis for the modern theory of computation.

In 1936, Turing went to Princeton University in America, returning to England in 1938. He began to work secretly part-time for the British cryptanalytic department, the Government Code and Cypher School. On the outbreak of war he took up full-time work at its headquarters, Bletchley Park.

Here he played a vital role in deciphering the messages encrypted by the German Enigma machine, which provided vital intelligence for the Allies. He took the lead in a team that designed a machine known as a bombe that successfully decoded German messages. He became a well-known and rather eccentric figure at Bletchley. After the war, Turing turned his thoughts to the development of a machine that would logically process information. He worked first for the National Physical Laboratory (1945-1948). His plans were dismissed by his colleagues and the lab lost out on being the first to design a digital computer. It is thought that



Bombe decryption machine

Turing's blueprint would have secured them the honour,

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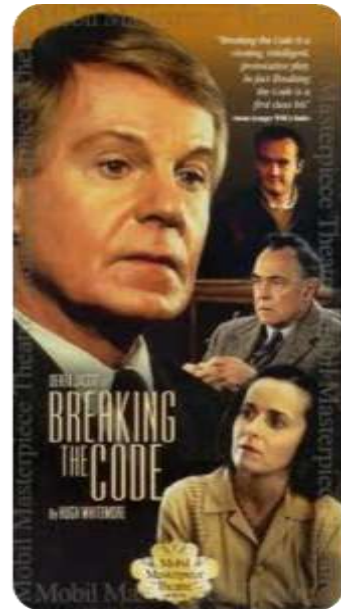
In order to get introduced to Whitmore's play you can watch the 1996 BBC film *Breaking the Code* featuring Derek Jacobi as Turing and Nobel Prize-winning playwright Harold Pinter as the mysterious "Man from the Ministry." Directed by Herbert Wise, the film is based on a 1986 play by Hugh Whitmore, which in turn was based on Andrew Hodge's 1983 book *Alan Turing: The Enigma*.

http://www.openculture.com/2012/02/alan_turing_ibreaking_the_code.html

as his machine was capable of computation speeds higher than the others. In 1949, he went to Manchester University where he directed the computing laboratory and developed a body of work that helped to form the basis for the field of artificial intelligence. In 1951 he was elected a fellow of the Royal Society.

In 1952, Turing was arrested and tried for homosexuality, then a criminal offence. To avoid prison, he accepted injections of oestrogen for a year, which were intended to neutralise his libido. In that era, homosexuals were considered a security risk as they were open to blackmail.

Turing's mental health is said to have taken a further turn for the worse when he was shut out of Britain's security operations – he had continued to work part-time for GCHQ, the post-war successor to Bletchley Park – due to Britain's post-war alliance with the US and concerns over cold war spying. He was found dead by his cleaner on 8 June 1954. The coroner's verdict was suicide, though Turing's mother believed he had accidentally ingested cyanide after a chemistry experiment.



In 2009, Gordon Brown made an official public apology on behalf of the British government for the way Turing was treated after the war.

1.2 Turing Machine and Turing Test

Today Turing is widely recognised as the genius that he was; we owe to him the foundations that underpin computing and computer programming: among others, the **“Turing machine”** – the idealised, conceptual computer; the ‘halting problem’ – Turing showed that there is no algorithm which can decide in all cases whether a computer programme will come to a halt or will go on running forever; and the ‘Turing test’ – which decides whether some machine of the future has real intelligence. Basically, if you ask whatever questions you like of a big black box, and if you cannot tell from its answers whether or not there is a person inside it doing the answering, then the black box is showing intelligent behaviour, whether what is inside it is a computer or a human being.

Given the ever-accelerating approach of Artificial Intelligence, the **“Turing test”** becomes ever more relevant. These were all devised in the days before computers, and Turing was intimately involved in the building and use of the first electronic programmable computer, **Colossus**, whose history is inextricably linked to codebreaking at Bletchley Park during the Second World War. There Turing was in charge of the team that broke, vitally for the Allies, the German Enigma codes, and the Lorentz codes which were even more complex.

For more info see the HP of Bletchley Park:
<http://www.bletchleypark.org.uk/content/machines.rhtm>



2 The Play

2.1 Synopsis

“Breaking The Code” tells the story of Alan Turing, who, seconded to the top secret Bletchley Park England during World War II, was responsible for designing the first computer, which enabled the allies to crack the German Enigma code and, some would argue, win the war. It was on Churchill's specific instructions that

Turing was given all the resources he required - and his personal behavior tolerated: Turing was a practicing homosexual at a time when it was illegal.

At Bletchley Park Turing encounters his new boss, Dillwyn Knox, who immediately recognizes Turing's genius and perhaps, his sexual predilections. Whilst discussing the practical applications of scientific research Turing speaks what is perhaps the central line of *“Breaking the Code”*: "I have always been willing - indeed eager - to accept moral responsibility for what I do." It was this uncompromising stance, plus his perhaps unworldly genius, which was Turing's strength when it came to scientific research, but was also his personal undoing.



“Breaking The Code” operates on two timescales, which are very skillfully inter-cut by Hugh Whitemore: the Second World War and England in the late 1950's. During the war we see the code-breaker at work, declining to compromise his nature by refusing to return the love of his female assistant, Pat Green. After the war we see Turing still doing research but getting progressively

entangled in the law after he has voluntarily gone to the Police to report a break in. When asked whom he suspects, Turing suggests one of his casual male lovers. To the Police Officer's surprise, Turing confesses to his homosexuality - which is illegal - and is charged. After his trial he meets Pat Green again, who knew he was

a homosexual but would have married him anyway, and who reveals that Dillwyn Knox had 'compromised' his own homosexuality and married conventionally. Turing also confesses to his mother who, although shocked, supports him.

Eventually Turing goes on holiday to Corfu and picks up a young Greek boy. Shortly afterwards Turing commits suicide.

2.2 A Comment on the play

Summarized as badly as this "**Breaking the Code**" sounds rather bleak; it is not. It is frequently very funny, always compassionate and provides real insight into the dilemmas and problems homosexuality in a genius presents, not just to Turing but to his family, his professional colleagues, and not least The State's preoccupation with National Security - in the shape of one John Smith the mysterious 'Man from the Ministry'.

This play is a "character study" of a fascinating mathematician. Although we do see some mathematics (including an especially nice description of Gödel's Theorem and its mathematical significance) the main focus of the play is Turing's sexual orientation and the way in which it broke the *moral* code of his society.

Alan Turing iterates that it wasn't breaking the code that mattered but what one did afterwards with his life. However, due to society's social standards, he asserts that he "should've stuck to the rules." This play shows **how greatness is often** stunted by conformity. For Turing, mathematics lead him to greatness, although no one knew of his contribution to the war effort after his death.



This play also addresses the differences between the

machine--the electronic brain-- and the human, who has "a failing memory...faculties fade, the body disintegrates, the mind crumbles." Without the machine to break the German Enigma, the war might not have been won, and without Turing, a mathematician, the machine might have never even existed.

Contributed by Rachel Barkley from:

<http://kasmana.people.cofc.edu/MATHFICT/mfview.php?callnumber=mf10>

2.3 Extracts from the script

from: Act I Scene 6

Ron I didn't know the RAF was up here.

Turing They were during the war.

Ron Were you here then?

Turing No.

Ron Where were you?

Turing Around and about.

Ron Doing what?

Turing Working for the government.

Ron Doing what?



Turing This and that.

Ron (*coaxing*) Tell me. **Turing** Can't. I promised not to. **Ron** Promised who?

Turing Mr Churchill.

Ron I know! - you were making secret weapons.

Turing In away.

Ron (*intrigued*) Really?

Turing (*playfully*) If it hadn't been for me, we'd have lost the war.

Ron (*grinning sceptically*) Oh yeh?

Turing Absolutely - listen, I'll tell you –

(*but then quickly changing the subject*) –

I'll tell you something else.

Ron What's that?

Turing That, um - that hangar down the road: it grows bigger at night.

Ron Bigger?

Turing It's true. You look.

Ron (*a grin*) Don't be daft.

Turing It seems to, anyway. In the daytime, it's just an ordinary large shed, but when the sun goes down it seems to get bigger and bigger. I'm thinking of writing a story about it.

Ron (*playing along*) Good idea.

Turing Do you think so?

Ron Why not?

Turing It's rather like that film you enjoyed so much.

Ron The one about the robot?

Turing Yes. It's quite creepy, quite spooky. I imagine that I go inside the hangar; it's deserted, derelict, very dark-you can't see a thing. And as I go in, the door bangs shut behind me.

Ron No way out.

Turing No way out. Then - then I realize that it's not a hangar at all. I'm trapped inside an enormous mechanical brain. And this brain, the hangar, starts to play chess with me. And I've got to win, otherwise I'll never get out. All day and all night we play; all the next day and all the next night. But the brain's too clever for me, I can't keep up with the moves - and I'm terrified I'll be trapped in there for the rest of my life. (*Brief pause*) The trouble is, I can't think of a good ending.

Ron Flash Gordon comes in and rescues you.

Turing smiles

Turing I thought perhaps I could find a piece of chalk and write a few sums on the wall: very easy sums, simple arithmetic, that sort of thing; and I'd do them deliberately badly, make silly mistakes; I'd do them so slowly and so badly that the brain would get more and more despairing and then, finally--

Ron What?

Turing The brain commits suicide. What do you think of that?

Ron Flash Gordon's better.

Turing (*a smile*) Maybe.

Ron stands up

Ron Got any tea?

Turing In the kitchen.

Ron exits

Ron (*off*) There's no milk.

Turing Sorry.

Ron returns

Ron No tea either, just coffee.

Turing We'll have some breakfast later.

Ron I'm starving. Aren't there any shops around here?

Turing There's a place at the end of the road.

Ron I'll run down, shall I? Got any money?

Turing Put your clothes on, I'll find some money.

Ron Right.

Ron exits. Turing takes his wallet from his jacket pocket. He is clearly surprised by what he finds inside; he recounts the bank notes, checking them carefully

Ron enters, now wearing a sweater and a windcheater

Ron I'll get some tea and milk. How about some bacon?

Turing Have you been taking money from my wallet?

Ron What?

Turing You heard.

Ron I haven't touched your bloody wallet.

Turing I had fifteen pounds in here yesterday, there's only seven left.

Ron It's nothing to do with me.

Turing Where's it gone then?

Ron How should I know?

Turing Come on give it back.

Ron I haven't got it!

Turing I don't believe you.

Ron All right, search me--

Turing Don't be ridiculous.

Ron -come on, search me.

Turing You've hidden it somewhere.

Ron What the fuck are you talking about?

Brief pause. Turing and Ron stand facing each other

Why should I take money from you?

Turing You said you were hard up.

Ron I didn't.

Turing You said you were out of work.

Ron So what?

Turing Please, Ron, give it back.

Ron Piss off!

Turing Give it back and we'll say no more about it.

Ron I'm not a bloody thief!

Turing You just said you were. You said you're on probation.

Ron If you think I pinched that money, call the police.

Turing does not move

Come on, there's the phone - what are you waiting for? (He grabs the telephone receiver)

Come on!

Turing Put it down.

Ron throws the telephone receiver on to the floor and strides angrily across the room: Turing stands motionless, looking at him

I'm sorry. I'm sorry. (He picks up the receiver and replaces it on the telephone) I lost my temper. I'm sorry.

No response

Perhaps I made a mistake.

Ron Fucking nerve!

Turing I'm sorry'

Ron goes to the door

Where are you going?

Ron I'm not bloody staying here.

Turing Please don't go.

Ron (*girlish, mocking him*) Please don't go.

Turing I must've been mistaken.

No response

I thought I had fifteen pounds. Perhaps I didn't. Let's forget about it. (*He takes some money from his wallet*) Go and get us some breakfast.

Ron (*mimicking him*) G-g-get it yourself.

Turing I've said I'm sorry.

Ron So what?

Turing Let's be friends. (*Pause. He takes a step towards Ron*) Do you want some money? Do you?

Ron almost replies; he hesitates

How much do you need?

Ron I'm not a bloody renter.

Turing I know. (*Brief pause*) If you're hard up, if you want some money, you've only got to ask.

Brief pause

Ron Call it a loan, then.

Turing How much?

Ron Three?

Turing takes three pounds from his wallet and gives them to Ron

Turing Shall I see you again?

Ron Maybe. Yeh, maybe.

Turing Perhaps I'll see you down the pub.

Ron Yeh. (*Brief pause*) I'd better go.

Turing Have some breakfast first. Tea and bacon. (*He offers more money for*

food) Have some breakfast, then go. I'll cook you bacon and eggs.

Ron hesitates

Ron I can't stay long.

Turing I know.

Ron OK. (*He takes the money*) Where's this shop? Down the road?

Turing Down the road, turn left. *Ron exits*

From: Act I Scene 7

Turing turns from her abruptly and plunges his hand into his pocket; he pulls out a fir cone

Turing Look at this. It's a fir cone.

Pat I can see it's a fir cone.

Turing Take it. Look at it.

Assignments:

How does Turing cope with the emotional problems in these two scenes?

How would you describe the nature of these emotional problems?

Which emotions are involved?

Do research on the notion of "emotional intelligence". According to your results, would you say Turing shows emotional intelligence?

Why does Turing`s mother Sara not believe in the suicide verdict? (see also p. 25!)

She does so I'll tell you something extraordinary about it.

Pat It looks ordinary enough to me.

Turing Define what is meant by a Fibonacci sequence.

Pat A Fibonacci sequence is a sequence of numbers where each is the sum of the previous two; so you start with one-then one plus one equals two – one and two, three - two and three, five - three and five, eight--

Turing (*continuing the sequence*) - five and eight, thirteen, and so on, etcetera. Well done, full marks. Now look at that fir cone. Look at the pattern of the bracts-the leaves. Follow them spiralling round the cone: eight lines twisting round to the left, thirteen twisting to the right. The numbers always come from the Fibonacci sequence.

Pat (*examining the fir cone more closely*) Always ... ?

Turing Always. And it's not just fir cones - the petals of most flowers grow in the same way. Isn't that amazing?

Pat Yes, it is.

Turing And it prompts the age-old question: is God a mathematician?



Turing smiles; Pat looks at him;

she returns the fir cone

Pat I love you, Prof.

No response

I love you. You know that.

Turing Yes.

Pat You're supposed to say "I love you too".

Turing I know.

Pause

Pat Please say something.

Turing I don't think of myself as a very lovable person.

Pat Well you are.

Turing There are lots of men at Bletchley who are much more lovable than I am.

All Stage Photos by Bobby Anders

from the 2012 English Theatre Frankfurt Production

Pat That's where you're wrong.

Turing Don't be silly, of course there are, I see them

every lunchtime, rushing around, laughing, playing cricket. I'm amazed you haven't fallen in love with one of them.

Pat Because they're dull, that's why.

Turing So am I.

Pat That's where you're wrong. You're untidy and messy and lacking

almost all the social graces; your clothes are stained and you bite your nails; you tell the truth when it would be kinder to tell a lie, and you've got no patience with people who bore you.

But you are not dull. And I love

you. *Pause*

Turing As a matter of fact, I do love you.

Pat (*not really a question*) As a friend.

Turing As a friend.

Pat That might change. (*A sad smile*) Perhaps it might change.

Turing goes to Pat and takes her by the hand

Turing I'm a homosexual.

Pat I know. That doesn't stop me loving you. It needn't stop you loving me.

Turing It would stop me making love to you. I don't want that sort of life and I don't think you do, either.

Sara enters, carrying a bowl of sugar. Seeing Turing and Pat, standing so intimately together, she immediately freezes

Sara Oh, I'm sorry.

Turing and Pat spring apart

Act II Scene 8

Sara To say that Alan took his own life is quite ridiculous. Everyone knew he did experiments at home. And he never washed his hands, never. It was obviously a tragic accident.

Ross I can't really offer an opinion, Mrs Turing.

Sara You met him. Do you think he was the sort of man to commit suicide?

Ross It's two or three years since I've seen him, and you never know what people might do in extreme circumstances.

Sara Let me tell you something about my son. His first day at Sherborne was also the first day of the General Strike. He bicycled all the way from Southampton to Sherborne - sixty miles! - so he would be sure of getting to school on time. It was reported in the local newspaper. A boy who could do that would never take his own life. He had everything to live for. Everything.

Black-out

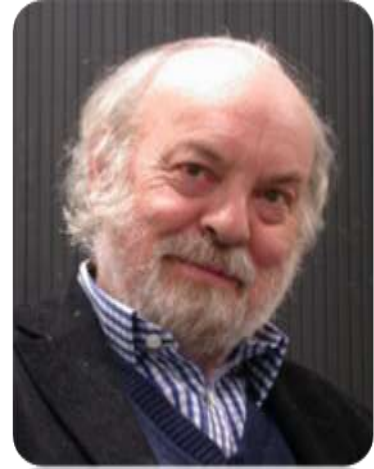


3 The Author: Hugh J. Whitmore

English playwright born Tunbridge Wells, Kent 16 June, 1936.

Hugh Whitmore studied for the stage at the Royal Academy of Dramatic Art (RADA), where he is now a Member of the Council. He began his career in British television, writing many original plays (contributing to *The Wednesday Play*, *Armchair Theatre* and *Play for Today*) and dramatizations (ranging from Kafka to Daphne du Maurier), twice receiving Writers' Guild Awards.

He has also written for American TV, including a four-hour film about the Alger Hiss case, *Concealed Enemies*, which won an Emmy Award for the best mini-series. He received an Emmy nomination for his dramatization of the Carl Bernstein/Bob Woodward book about President Nixon, *The Final Days*.



His stage plays include *Stevie* (starring Glenda Jackson), *Pack of Lies* (starring Judi Dench), *Breaking the Code* (starring Derek Jacobi), *The Best of Friends* (starring John Gielgud in his farewell stage performance), *It's Ralph* (starring Timothy West), *A Letter of Resignation* (starring Edward Fox), *Disposing of the Body* (starring Stephen Moore) and *God Only Knows* (starring Derek Jacobi). These plays have been translated into many languages and produced throughout the world.

Hugh Whitmore's work has twice been named Best Single TV drama by the UK Broadcasting Press Guild. He has received the Scriptor Prize in Hollywood, the Script Prize at the 1998 Monte Carlo Festival and a special Communications Award from the American Mathematical Society. He is a Fellow of the Royal Society of Literature.



4 Reviews of the play

4.1. *Breaking the Code* at the Theatre Royal, Northampton

Hugh Whitmore's 1986 play about Alan Turing, the man who broke the Enigma code during the second world war, invented the computer and committed suicide in the early 1950s after being convicted of gross indecency because of his relationship with a man, has worn well. Almost 20 years ago, it had a successful run in the West End, and it strikes me as exactly the kind of play the West End now lacks. It is intelligent, multi-layered in its examination of loyalty and national expediency and full of understated passion. And any play that can make mathematics sexy definitely gets my vote.

Philip Wilson's clean production and fine period detail make the play seem startlingly contemporary. However, the innovative design, with its clever use of film, doesn't entirely overcome the problems of a revolve that can make the shifts of scene and time seem as if they are taking centuries.

It is a minor irritation in an evening that clearly highlights the fact that it was old ways of thinking that ensured success during the war, only for him to fall victim to the suffocating stuffiness and petty thinking of postwar Britain.

There are terrific performances all round, with Zoe Waites outstanding as Pat Green, the brilliant young mathematician with an unrequited passion for Turing, whose usefulness to her country ceased as soon as the war ended. But the evening gets its real energy from Philip Franks, who, as Turing, gives one of the most outstanding performances of the year. It is a superb piece of acting, powered by the searing passion and touching puzzlement of a brilliant man who knows too well that even when all scientific problems have been answered, the problems of life remain.

By **Lyn Gardner**, *The Guardian*, Thursday 13 November 2003

4.2 Hugh Whitmore's exceptional drama about Alan Turing, who cracked the Nazi Enigma Code in WW II at the Oxford Theatre Guild

I (and thousands of others) owe a great debt to Alan Turing. It can be strongly argued that he, with help, shortened World War II by two years because his amazing mind led the team of people who cracked the Enigma codes at Bletchley Park and enabled the Allies to anticipate Nazi strategy. So why, having become Churchill's friend, with an OBE in his desk drawer, and aged only 41, did he kill himself?

Hugh Whitmore's brilliant dramatisation of Turing's life takes us from Sherbourne School in the twenties, where Turing met his first love, through his time at Cambridge and Princeton universities, where his theories took shape, on to Bletchley, with its wonderful, eccentric minds (including the beautiful woman who fell in love with him and stayed that way until his death), and finally, to a desperate affair that began in a dirty Manchester pub and ended in court. Having saved us from Nazi Germany, he was ostracized and vilified by us, because he was stupid enough to freely confess his homosexuality. It's a wonderful homage to an extraordinary man and a furious indictment of the hypocrisy of the society that he saved from occupation, and I was saddened to hear one audience member at the interval comment that there was "Too much of the sordid stuff, and not enough about the war". Bruce Walton does well to bring Alan Turing credibly to life; his task is huge (on stage throughout) and the intellectual gymnastics are demanding. I wanted more passion and relish for his work, and I should have sympathised with his emotional turmoil more, but energy and focus were strong all evening.

Peter Bloor's spare set design works well, but fussy directing of this episodic play means that scene changes take far too long and the pace of the story is often lost. The pre-show and interval music was too quiet, the house lights were too bright, and the stage lighting was unflattering, but the substantial first night audience readily lapped up the mesmerising story being told. Even an unfortunate accident to a member of the cast, forcing the director to step in at an hour's notice, couldn't upset a slick, professional production of a superb script. I walked away grateful; to Alan Turing, to Hugh Whitmore, and to the brave choice of a vital play by a committed group of people.

Steve Woodward 01/05/08

4.3 Other British Press Reviews



"BREAKING THE CODE "was the best one-off drama I've seen this year, and last year actually. Derek Jacobi turned in a sensational performance. I'm happy to eat my words about stage plays never working on television. The plot wove through layers and layers of meaning and nuances, the Enigma machine acting as a central metaphor for hidden truth, deceit and secrets." "None of the characters was quite what you imagined, and I'd never have believed I'd be riveted by a 10-minute soliloquy on

pure math and Wittgenstein. But I was. I'm sorry. I'm not doing this play justice. You should have seen it. Singling out Jacobi for acclaim is a disservice to the rest of the cast who were all equally brilliant, including Harold Pinter who was so unnervingly spooky that I don't believe he was acting at all."

A Gill, The Sunday Times, February 9th 1977

"Whitmore's superb script counter-points Turing's ruthlessly logical mind with the instinctive human honesty - in life as in art, he was incapable of deceit - which proved to be his undoing. The combination of scientific genius and worldly innocence achieved by Jacobi was deeply affecting, enhanced as it was by wonderfully nuanced Englishness from Richard Johnson as his boss, Prunella Scales as his mother, Amanda Root as his would-by wife and Harold Pinter as a really scary Orwellian bureaucrat." **Anthony Holden, The Express on Sunday, February 9th 1997**

Assignment:

Compare the reviews.

Which highlights are mentioned?

Write your own review of the ETF production and present it in class!

Compare with the local press!

See: <http://www.english-theatre.org/programme/review/>

5 War History Background

5.1 Secret messages and Codebreaking

Statistics was and is central to codebreaking. In a world of no certainty, faced with million upon million of possible combinations of code-letters to check and from which to extract the message you need, and with the vital necessity of doing it quickly so that it can be acted upon, you have to be able to concentrate on the most probable combinations to pursue further. Turing's insights into the application of statistics to codebreaking were vital.

A coded message will be a string of random letters – so random that each letter will appear, on average, the same number of times. But an uncoded message, in English, or German, will have some letters appearing much more often - in English, E appears about three times more frequently than random, and a similar result holds in German. A key in codebreaking was to find two messages that had been encoded in exactly the same way – that is, using the same settings of the Enigma machine's wheels. An early insight of Turing's, from perhaps 1939, was that, if two coded messages could be arranged, one above the other, so that the letters that matched in them were not random but obeyed the statistical letter frequencies of the German language, then the messages were likely to have been encrypted using the same settings of the Enigma wheels. That was merely a starting-point for the incredibly complex and many-staged decoding procedure, devised and put into practice by Turing, but it was a necessary starting-point.

Of all Turing's insights this was perhaps mathematically a most minor one; but Turing was such a colossus that even a minor part of his thinking was of crucial importance in winning the Second World War.

The codebreakers worked in crude wooden huts. The Colossus computer ran on 2,500 valves which generated so much heat that in the bitter wartime winters the Wrens (Members of the Women's Royal Naval Service) who operated it used to hang their laundry around it to dry.

5.2 The Enigma

Stealing secrets

Arthur Scherbius, a German engineer, developed his 'Enigma' machine, capable of transcribing coded information, in the hope of interesting commercial companies in secure communications. In 1923 he set up his Chiffriermaschinen Aktiengesellschaft (Cipher Machines Corporation) in Berlin to manufacture his product. Within three years the German navy was producing its own version, followed by the army in 1928 and the air force in 1933.

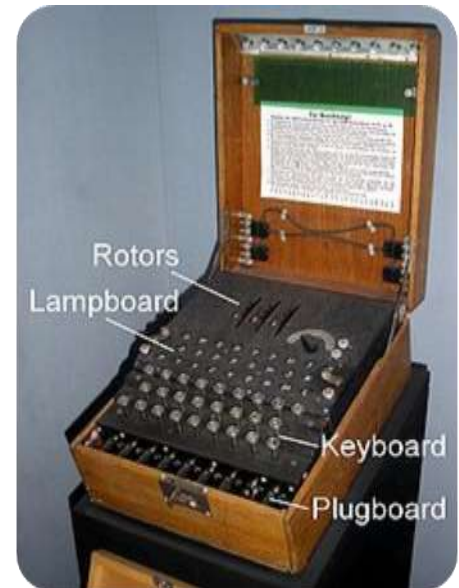
Enigma allowed an operator to type in a message, then scramble it by using three to five notched wheels, or rotors, which displayed different letters of the alphabet. The receiver needed to know the exact settings of these rotors in order to reconstitute the coded text. Over the years the basic machine became more complicated as German code experts added plugs with electronic circuits.

Britain and her allies first understood the problems posed by this machine in 1931, when Hans Thilo Schmidt, a German spy, allowed his French spymasters to photograph stolen Enigma operating manuals. Initially, however, neither French nor British cryptanalysts could make headway in breaking the Enigma cipher.

It was only after they had handed over details to the Polish Cipher Bureau that progress was made. Helped by its closer links to the German engineering industry, the Poles managed to reconstruct an Enigma machine, complete with internal wiring, to read the German forces' messages between 1933 and 1938.

Ultra intelligence

With German invasion imminent in 1939, the Poles opted to share their secrets with the British, and Britain's Government Code and Cipher School (GC&CS) at



Bletchley Park, Buckinghamshire, became the centre for Allied efforts to keep up with dramatic war-induced changes in Enigma output.

Top mathematicians and general problem-solvers were recruited and a bank of early computers, known as 'bombes', was built to work out the Enigma's vast number of settings. The Germans were convinced that Enigma output could not be broken, so they used the machine for all sorts of communications on the battlefield, at sea, in the sky and, significantly, within its secret services. The British described any intelligence gained from Enigma as 'Ultra', and considered it top secret.

Only a select few commanders were made aware of the full significance of Ultra, and used it sparingly to prevent the Germans realising their ciphers had been broken. **By Andrew Lycett BBC**

5.3 A British View on the Americans

"I am persuaded that one cannot very well trust these people where a matter of judgement in cryptography is concerned." **Dr. Alan Turing**

Wartime code-breakers failed to click By Dominic Casciani

Being allies in wartime is a difficult business. Just ask Defence Secretary Geoff Hoon who this week told MPs that Britain would have failed in its duty as an ally if it does not send British troops to assist Americans in a dangerous part of Iraq.

But documents revealed at the National Archive reveal allies often fall out at the most crucial of times - and in the case of wartime code-breaking, Britain believed it was in the right to give Washington the brush off. The UK's code breakers at Bletchley Park were instrumental to the winning of World War II.

Despite a recent reinterpretation of history by Hollywood, the team, which included mathematical genius Dr Alan Turing, the father of computing, were crucial to breaking Nazi Germany's codes. Their biggest and most important breakthrough was cracking the Enigma machine, the encoding engine, which rendered communications indecipherable without access to the technology.

But while the Americans made their own technical leaps forward, not least with the invention of the atom bomb, tensions mounted over what the code breakers were prepared to share with US colleagues.

Urgent telegram

By October 1941 Dr Turing's team had worked out that Enigma traffic was split into a number of zones and then further split depending on the type of message being sent. Adding to the challenge, completely different encryption methods were used for messages within Germany, between the Nazi high command and between Berlin and axis partner Rome. The team at Bletchley Park desperately needed access to American advances down the road towards computing.

But Washington was convinced London was withholding information that could prove essential to its own war effort. In November 1941 an urgent telegram from Washington reached the attention of Sir Stewart Menzies, the chief of the secret service. Adm. Leigh Noyes, head of US Navy communications claimed London had gone back on a deal of free exchange of information between the code-breakers.

"He states they are aware that you hold certain European code books and keys which he claims by virtual agreement should be imparted to Washington for their use," Sir Stewart was told. "Noyes is in a mood to withhold further information unless he receives full reciprocal information on European work."

In short, military co-operation in this sphere of the war was short on the ground. But London stood firm. It stressed it was passing all it had of use to Washington - but would not pass over material that was not apparently relevant to the American cryptographers. Adm. Noyes retorted only the cryptographers could be in a position to judge what was important, and his team were making great leaps forward in mechanical answers to code-breaking. The row spilled over into 1942 with London apparently insisting it was doing all it could. However a separate internal memo revealed Washington had not been told of the capture of an Enigma unit from a U-boat.

In an attempt to calm the waters, Dr Turing himself was sent to the US to see what the teams could learn from each other.

Despite public knowledge of the code-breakers since the 1970s, Dr Turing's report has remained secret until now. It goes into rich detail of how the operations furiously worked to break the Nazi communications system.

But amid the mass of technical data, his conclusion on American efforts was clear - they were not up to the task.

Dr Turing said: "Generally speaking, their attitude is so purely mechanical and mathematical that they often fail to see the wood for the trees and do not like to admit that experience and a knowledge of immediately prior developments, combined with a little manual work, may often produce the answer more quickly than machinery. "I am persuaded that one cannot very well trust these people where a matter of judgement in cryptography is concerned."

He asked to bring all the new American technology back to the UK, believing his team could make much better use of the machines. His proposal was supported and his team eventually built Colossus, one of the world's first programmable machines.

Story from BBC NEWS:

http://news.bbc.co.uk/go/pr/fr/-/2/hi/uk_news/3758276.stm

Published: 2004/10/20 © BBC

6 Aspects of the debate about Alan Turing

6.1 New popularity: the Happy New Year of Alan Turing

2012 has been designated the Alan Turing Year, and June 23rd 2012 is the centenary of his birth. Turing, of course, is the mathematical giant who made a unique impact on computing, computer science, artificial intelligence, developmental biology and almost everything else including codebreaking and the outcome of the Second World War. His work in charge of the Engima- and other code-breaking teams at Bletchley Park is said to have shortened the war by up to two years (though that of course is more of a guess than a calculation). But it has justifiably said that there is no discipline in science that Turing has not had an impact upon.

Despite his wartime contribution he was shamefully treated in his lifetime. Amends are now being made. In February, the Royal Mail are including his image on a set of stamps. The UK's new Technology and Innovation Centres are to be named Turing Centres in his honour.

The Channel 4 TV documentary on his life 'Britain's Greatest Codebreaker' was broadcast just before Christmas 2011.



The DiCaprio code ... Actor spies role as Bletchley Park codebreaker Alan Turing.
Photograph: Toru Yamanaka/AFP/Getty Images

Leonardo DiCaprio is the frontrunner to play Alan Turing in a forthcoming biopic of the British mathematics genius and codebreaker.

6.2 Still No Pardon for Alan Turing ?

This week the British government once again refused to pardon Alan Turing. On Monday, Justice Minister Tom McNally told the House of Lords that the government of Prime Minister David Cameron stood by the decision of earlier governments to deny a pardon, noting that the previous prime minister, Gordon Brown, had already issued an "unequivocal posthumous apology" to Turing. McNally was quoted in **THE GUARDIAN**:

“A posthumous pardon was not considered appropriate as Alan Turing was properly convicted of what at the time was a criminal offense. He would have known that his offense was against the law and that he would be prosecuted. It is tragic that Alan Turing was convicted of an offense which now seems both cruel and absurd—particularly poignant given his outstanding contribution to the war effort. However, the law at the time required a prosecution and, as such, long-standing policy has been to accept that such convictions took place and, rather than trying to alter the historical context and to put right what cannot be put right, ensure instead that we never again return to those times”.

Assignment:

Do you think enough justice has been done to Alan Turing?

Or should there be an official and legal pardon?

Find out more about initiatives for Turing:

<http://submissions.epetitions.direct.gov.uk/petitions/23526>

The decision came as a disappointment to thousands of people around the world who had petitioned for a formal pardon during the centenary year of Turing's birth.

Efforts to obtain a pardon for Turing are continuing. British citizens and UK residents can still sign the petition.

6.3 Obama passes the “Turing test”!

President Obama addressed the UK Houses of Parliament last week; and his speech contained the following tribute to great men of science from both countries: ‘...



From Newton and Darwin to Edison and Einstein; from Alan Turing to Steve Jobs, we have led the world in our commitment to science and cutting-edge research.’

Newton and Darwin are naturals of course in that context; but Turing was for many years shamefully

neglected (as well as shamefully treated) by his native country, and we should thank an American president for pointing out that he belongs in the same company as those other giants.

From: *Current Affairs, Film, Math, Politics* | February 10th, 2012

6.4 A detective story: Inquest's suicide verdict 'not supportable' ?

By Roland Pease BBC Radio Science Unit

Roland Pease has produced two episodes of Discovery on the BBC World Service devoted to Turing. In the first, he follows the events leading up to Turing's design for a fully programmable computer (Ace) at the National Physical Laboratory. In the second episode, he explores the life and legacy of Turing

Alan Turing, the British mathematical genius and codebreaker born 100 years ago on 23 June, may not have committed suicide, as is widely believed. Turing expert Prof Jack Copeland (University of Canterbury, Christchurch, New Zealand) has questioned the evidence that was presented at the 1954 inquest. He believes the evidence would not today be accepted as sufficient to establish a suicide verdict. Indeed, he argues, Turing's death may equally probably have been an accident. What is well known and accepted is that Alan Turing died of cyanide poisoning. His housekeeper famously found the 41-year-old mathematician dead in his bed, with a half-eaten apple on his bedside table.

It is widely said that Turing had been haunted by the story of the poisoned apple in the fairy tale of Snow White and the Seven Dwarfs, and had resorted to the same desperate measure to end the persecution he was suffering as a result of his homosexuality. But according to Prof Copeland, it was Turing's habit to take an apple at bedtime, and that it was quite usual for him not to finish it; the half-eaten remains found near his body cannot be seen as an indication of a deliberate act. Indeed, the police never tested the apple for the presence of cyanide.

Moreover, Prof Copeland emphasizes, a coroner these days would demand evidence of pre-meditation before announcing a verdict of suicide, yet nothing in the accounts of Turing's last days suggest he was in anything but a cheerful mood. "We have... been recreating the narrative of Turing's life, and we have recreated him as an unhappy young man who committed suicide. But the evidence is not there"

He had left a note on his office desk, as was his practice, the previous Friday to remind himself of the tasks to be done on his return after the Bank Holiday

weekend. Nevertheless, at the inquest, the coroner, Mr JAK Ferns declared: "In a man of his type, one never knows what his mental processes are going to do next." What he meant by "of his type" is unclear.

The motive for suicide is easy to imagine. In 1952, after he had reported a petty burglary, Turing found himself being investigated for "acts of gross indecency" after he revealed he had had a male lover in his house. Faced with the prospect of imprisonment, and perhaps with it the loss of the mathematics post he held at Manchester University, which gave him access to one of the world's only computers, Turing accepted the alternative of "chemical castration" - hormone treatment that was supposed to suppress his sexual urges.

It is often repeated that the chemicals caused him to grow breasts, though Turing is only known to have mentioned this once. The authorities' continuing interest in Turing became apparent in 1953 when a gay Norwegian acquaintance, Kjell, announced by postcard his intention to visit him at his Wilmslow home, but mysteriously never arrived. Turing told a friend, by way of explanation: "At one stage, the police over the north of England were out searching for him."

With six decades of hindsight, these oppressive attentions, the nation's failure to appreciate his wartime contributions, his apparent sidelining at the Manchester computer department, have led to a tragic picture of Turing being hounded during his last years, and suicide being a natural outcome. But Prof Copeland argues that on the contrary, Turing's career was at an intellectual high, and that he had borne his treatment "with good humour". Of the Kjell affair, Turing had written that "for sheer incident, it rivalled the Arnold [gross-indecency] story"; and immediately after his conviction had told a friend: "The day of the trial was by no means disagreeable.

"Whilst in custody with the other criminals, I had a very agreeable sense of irresponsibility, rather like being back at school." On the face of it, these are not the expressions of someone ground down by adversity. What is more, Turing had tolerated the year-long hormone treatment and the terms of his probation ("my shining virtue was terrific") with amused fortitude, and another year had since passed seemingly without incident. In statements to the coroner, friends had attested to his good humour in the days before his death. His neighbour described him throwing "such a jolly [tea] party" for her and her son four days before he died.

His close friend Robin Gandy, who had stayed with him the weekend before, said that Turing "seemed, if anything, happier than usual". Yet the coroner recorded a verdict of suicide "while the balance of his mind was disturbed". Prof Copeland believes the alternative explanation made at the time by Turing's mother is equally likely. Turing had cyanide in his house for chemical experiments he conducted in his tiny spare room - the nightmare room he had dubbed it.

He had been electrolysing solutions of the poison, and electroplating spoons with gold, a process that requires potassium cyanide. Although famed for his cerebral powers, Turing had also always shown an experimental bent, and these activities were not unusual for him.

But Turing was careless, Prof Copeland argues. The electrolysis experiment was wired into the ceiling light socket. On another occasion, an experiment had resulted in severe electric shocks. And he was known for tasting chemicals to identify them. Perhaps he had accidentally put his apple into a puddle of cyanide.

Or perhaps, more likely, he had accidentally inhaled cyanide vapours from the bubbling liquid. Prof Copeland notes that the nightmare room had a "strong smell" of cyanide after Turing's death; that inhalation leads to a slower death than ingestion; and that the distribution of the poison in Turing's organs was more consistent with inhalation than with ingestion.

In his authoritative biography, Andrew Hodges suggests that the experiment was a ruse to disguise suicide, a scenario Turing had apparently mentioned to a friend in the past.



But Jack Copeland argues the evidence should be taken at face value - that an accidental death is certainly consistent with all the currently known circumstances. The problem, he complains, is that the investigation was conducted so poorly that even murder cannot be ruled out. An "open verdict", recognizing this degree of ignorance, would be his preferred position.

None of this excuses the treatment of Turing during his final years, says Prof Copeland. "Turing

was hounded," he told the BBC, adding: "Yet he remained cheerful and humorous."

Turing was injected with Stilboestrol - a synthesised form of oestrogen

"The thing is to tell the truth in so far as we know it, and not to speculate. In a way we have in modern times been recreating the narrative of Turing's life, and we have recreated him as an unhappy young man who committed suicide. But the evidence is not there. The exact circumstances of Turing's death will probably always be unclear," Prof Copeland concludes.

"Perhaps we should just shrug our shoulders, and focus on Turing's life and extraordinary work." .

Assignment:

List the arguments and proofs for and against the suicide theory.

Discuss them in class!

Why is it more interesting for a writer of fiction like Whitemore to stick to the suicide thesis?

7 Homosexual relationships: the struggle for recognition

7.1 In Shift, U.S. Says Marriage Act Blocks Gay Rights

The New York Times

By CHARLIE SAVAGE and SHERYL GAY STOLBERG Published: February 23, 2011

WASHINGTON — President Obama, in a striking legal and political shift, has determined that the Defense of Marriage Act — the 1996 law that bars federal recognition of same-sex marriages — is unconstitutional, and has directed the Justice Department to stop defending the law in court, the administration said Wednesday.

Advocates of same-sex marriage hailed the president's decision; critics called it a politicization of the Justice Department.

Attorney General Eric H. Holder Jr. announced the decision in a letter to members of Congress. In it, he said the administration was taking the extraordinary step of refusing to defend the law, despite having done so during Mr. Obama's first two years in the White House.

“The president and I have concluded that classifications based on sexual orientation” should be subjected to a strict legal test intended to block unfair discrimination, Mr. Holder wrote. As a result, he said, a crucial provision of the Defense of Marriage Act “is unconstitutional.”

Conservatives denounced the shift, gay rights advocates hailed it as a watershed, and legal scholars said it could have far-reaching implications beyond the marriage law. For Mr. Obama, who opposes same-sex marriage but has said repeatedly that his views are “evolving,” there are political implications as well. Coming on the heels of his push for Congress to repeal the “don’t ask, don’t tell” law barring the military from allowing gay people to serve openly, the administration’s move seems likely to intensify the long-running cultural clash over same-sex marriage as the 2012 political campaign is heating up.

“This is a great step by the Obama administration and a tipping point for the gay rights movement that will have ripple effects in contexts beyond the Defense of Marriage Act,” said Anthony D. Romero, the executive director of the American Civil Liberties Union. “It will reach into issues of employment discrimination, family recognition and full equality rights for lesbian and gay people.”

But some conservatives questioned Mr. Obama’s timing and accused him of trying to change the subject from spending cuts to social causes. Others portrayed the Justice Department’s abandonment of the Defense of Marriage Act as an outrageous political move that was legally unjustified.

While the issue at hand is whether gay couples in the eight states that already legally recognize same-sex marriage may be discriminated against by the federal government, the administration’s decision raised anew the more fundamental question of whether same-sex couples should have a right to marry.

Mr. Obama takes a nuanced position on same-sex marriage, and the White House was careful to say on Wednesday that his position on that issue remains unchanged. Many advocates of same-sex marriage, though, perceived the administration’s new legal stance as a signal that Mr. Obama would soon embrace their cause.

Polls show the public is broadly supportive of equal rights for gay people — with the exception of the right to marry. Nearly 90 percent of Americans favor equality of opportunity in the workplace, and more than 60 percent favored overturning

“don’t ask, don’t tell.” But the public remains evenly divided on same-sex marriage.

If the courts agree with the administration’s view of how to evaluate gay-rights claims of official discrimination, it could open the door to new legal challenges to many other government policies that treat gay people unequally — including federal laws that make it easier for noncitizen spouses to apply for legal residency and state laws governing who may adopt a child.

Assignment:

Compare the situation in the U.S.A with the current debate in Germany.

See f.ex. DIE ZEIT 16.8.12 Seite 3

“Wir sind auch eine Familie“.

As a result, the administration, for the first time, confronted the difficult question of how much protection gay people, as a group, should receive against official discrimination. Mr. Holder said Justice and White House officials had concluded that gay people qualified for the greater protection afforded to a handful of classes, like race or gender. Under that test, discrimination is presumed to be unconstitutional, and Mr. Holder said it was untenable to keep defending the marriage law.

7.2 History of Homosexuality and Law in the United Kingdom



1290 First mention in English common law of a punishment for homosexuality

1300 Treatise in England prescribed that sodomites should be burned alive

1533 Buggery Act introduced by Henry VIII brought sodomy within the scope of statute law for the first time and made it punishable by hanging.

1861 Offences Against the Person Act formally abolished the death penalty for buggery in England and Wales.

1895 The trials of Oscar Wilde and his sentencing to two years prison with hard labour under the 1885 Act.

1897 English edition of the book Sexual Inversion by Havelock Ellis and John Addington Symonds published. First book in English to treat homosexuality as neither a disease nor a crime, maintaining that it was inborn and unchangeable.

1948 Alfred Kinsey published Sexual Behaviour in the Human Male which stated that 4% of men identified as exclusively homosexual and 37% had enjoyed at least one homosexual experience in their lives.

1954 Appointment of the Wolfenden Committee on 24 August to consider the law in Britain relating to homosexual offences. Wolfenden Report published on 3 September 1957

1956 The Sexual Offences Act became law, determining much police activity against homosexuals in the UK for the rest of the century.



1958

To find out more about this topic see:

<http://www.stonewall.org.uk/>

Foundation of the Homosexual Law Reform Society (HLRS) on 12 May.

1967 Sexual Offences Act came into force in England and Wales and decriminalised homosexual

acts between two men over 21 years of age and 'in private.'

The Stonewall Inn, taken September 1969. The sign in the window reads: "We homosexuals plead with our people to please help maintain peaceful and quiet conduct on the streets of the Village.

1970 First ever organised lesbian and gay pride march took place on 28 June in New York City commemorating the previous year's Stonewall riot. London Gay Liberation Front (GLF) founded at the London School of Economics on 13 October. First gay demonstration in the UK took place in Highbury Fields in Islington.

1972 Law Lords found the International Times magazine guilty of 'conspiracy to corrupt public morals' for publishing gay contact advertisements. Gay News, UK's first gay newspaper, founded. SMG launched a

The **Stonewall riots** were a series of spontaneous, violent demonstrations against a police raid that took place in the early morning hours of June 28, 1969, at the Stonewall Inn, in the Greenwich Village neighborhood of New York City.

American gays and lesbians in the 1950s and 1960s faced a legal system more anti-homosexual than those of some Warsaw Pact countries. Early homophile groups in the U.S. sought to prove that gay people could be assimilated into society, and they favored non-confrontational education for homosexuals and heterosexuals alike. The last years of the 1960s, however, were very contentious, as many social movements were active, including the African American Civil Rights Movement, the Counterculture of the 1960s, and antiwar demonstrations. These influences, along with the liberal environment of Greenwich Village, served as catalysts for the Stonewall riots.

campaign to decriminalise homosexuality in Scotland.

1973 First UK gay helpline founded in Oxford. First national gay rights conference was held by CHE in Morecombe

1977 Lord Arran`s Bill to reduce the gay age of consent to 18 defeated in the House of Lords.

1979 Gay Life, the first ever gay TV series, commissioned for British TV by London Weekend Television. Gays the Word bookshop is established in London

1980 Male homosexuality decriminalised in Scotland. European Commission ruled unanimously that the British government was guilty of breaching Article 8 of the European Convention on Human Rights by refusing to legalise consenting homosexual behaviour in Ulster. First black lesbian and gay group founded.

1981 European Court of Human Rights found in favour of Northern Irish gays.

1982 Terrence Higgins Trust launched, named after the gay man thought to be the first to have died with AIDS in the UK.

1987 The British Government delivered a leaflet on AIDS, with the London Lesbian and Gay Switchboard telephone number, to every household in the country. The switchboard phonelines overloaded with the response. Lesbian & Gay Police Association (LAGPA, later the Gay Police Association GPA) formed.

1992 Isle of Man decriminalised homosexuality.

1993 Stonewall & ILGA produced first European survey of lesbian & gay rights for the European Commission.

1994 House of Commons voted to reduce gay male age of consent to 18. Huge disappointment that it had not been reduced to 16.

1997 On 3 May Chris Smith became Britain's first out-gay cabinet minister when appointed National Heritage Secretary. New Labour Government recognised same sex partners for immigration purposes. On 3 September Labour MP Angela Eagle was the first British MP to come out voluntarily as a lesbian.

1998 Two more British Labour MPs, David Borrow and Gordon Marsden, came out as gay. 336 MPs voted in the House of Commons, an overwhelming majority vote for an equal age of consent. Gregory Woods appointed the first Professor of Lesbian and Gay studies in the UK. On 22 June the British House of Commons voted to set the age of consent for gay men at 16 in a debate on the Crime and Disorder Bill. Nick Brown MP became the first British Cabinet minister to come out publicly as gay while in post.

2000 Government lifts the ban on lesbian and gay men serving in the armed forces. The report Setting the Boundaries published by the Sexual Offences Review Group. Ruling by the European Court on Human Rights results in the need to re-draft UK sexual offences law.

2001 First same-sex partnerships registered in London at the GLA.

2002 Equal rights granted to same sex couples applying for adoption. Alan Duncan became the first serving British Conservative Party MP to voluntarily come out publicly as gay.

2003 Employment Equality (Sexual Orientation) Regulations became law on 1 December making it illegal to discriminate against lesbians, gay men and bisexuals in the workplace.

2004 Civil Partnership Bill introduced. Sexual Offences Act abolishes the crimes of buggery and gross indecency. Government launches a white paper Fairness for All: A new Commission for Equality and Human Rights covering all areas of inequality in terms of race, gender, disability, sexual orientation, age and religion. Government amends the Equality Bill, including a clause to make it illegal to discriminate against lesbians and gay men in the provision of goods and services – from NHS care through to hotels and restaurants.

2006 The Equality Act 2006 - which establishes the CEHR and makes discrimination against lesbians and gay men in the provision of goods and services illegal - gains Royal assent on 16 February 2006.

Holocaust Memorial Day

enquiries@hmd.org.uk

Web: www.hmd.org.uk

7.3 Nazi persecution of gay people and the Holocaust

Thriving gay and lesbian communities had developed in Germany from 1900 to the early 1930s. This changed when the Nazis came into power in 1933.

Holocaust Memorial Day

The Nazis declared aim was the eradication of homosexuality. During 12 years in power they implemented a broad range of persecutory measures. An estimated 50,000 gay men were sentenced and imprisoned, some of whom faced the death penalty. Up to 15,000 gay men were deported to concentration camps and made to wear the pink triangle symbol which identified them as homosexual men. Many of these Pink Triangle detainees were subjected to starvation and hard labour, castration, medical experiments and collective murder actions.

Lesbianism was not illegal in Germany, so lesbians did not suffer the same level of persecution as gay men. However, there is historical evidence of police records being collected on lesbians and of lesbians being sent to concentration camps on the grounds of their sexual orientation. They were known as Green Triangle detainees. New research shows that in Austria lesbians were criminalized and liable for prosecution and persecution.

After the war, neither the Allies nor the German or Austrian States recognised gay men or lesbians as victims alongside other groups, so they were not considered eligible for compensation. Only in 2001 was the German and Swiss Bank compensation programme extended to include gay victims.

Nazi laws against homosexuality remained in place in Germany until 1967. Unsurprisingly, very few victims of wartime persecution came forward to fight for recognition. Those that did were often further victimised. Comparatively few known victims are still alive today.

Holocaust Memorial Day

Holocaust Memorial Day is commemorated annually in the UK. The purpose of Holocaust Memorial Day is to remember the Holocaust and other victims of the Nazi era in a way that alerts us to what can happen if we do not take personal and collective responsibility for tackling racism and other forms of bigotry.

The national event takes place on 27 January, and many other events take place in schools and communities throughout the month.