National Anti-Counterfeiting Bureau
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CENTRE OF EXPERTISE
- Assist in the standardization/minimum security and redesign of security documents.
- Threat assessment and intelligence reporting on methods of counterfeiting and alterations of security in documents.
- Develop and deliver training programs for counterfeit/altered document recognition.
- Investigative aids and databases.
- Adversarial analysis/security feature assessment.

CURRENCY
- Banknote & Negotiable Instruments Examination
- Investigative Assistance Classification / Database
- Bulletin Production
- Bitmap Analysis, Correlation of Equipment
- Coin Examination
- Printing Equipment Examination
- Search and Seizure

TRAVEL DOCUMENTS
- Travel & Identification Document Examination
- Investigative Assistance Classification / Database
- Bitmap Analysis, Correlation of Equipment
- Bulletin Production

HANDWRITING/HANDPRINTING
- Handwriting & Handprinting Examination
- Altered/Erased/Obliterated/Indented Examinations
- Images from Mechanical Action
- Physical Match
- Anonymous Letters

PAYMENT CARDS
- Payment Card Examination
- Investigative Assistance Classification / Database Interpol / USSS
- Bulletin Production
Definition of a ‘Document’

• Any object bearing marks, signs, or symbols either visible, partially visible or invisible intended to convey a message or meaning to someone.
Handwriting Examination and Comparison

Basic Principles

- No two people ever write exactly alike
- The natural handwriting of an individual will always show variation
Handwriting Identification

- Based upon the **Individuality** of the handwriting
- Handwriting development (habit)
- Features most divergent from the norm
- Subtle and inconspicuous features
- A significant combination of similarities and no fundamental differences between the questioned handwriting and the comparison specimens
Natural vs. Unnatural Handwriting

Natural Handwriting
- Subconscious
- Reflex Action
- Habitual

Unnatural Handwriting
- Conscious
- Deliberate
- ‘Drawing’
- Simulation
- Tracing
- Disguise

May be distorted by external factors such as alcohol, medication, illness or environment
Examples

Natural Handwriting

Unnatural Handwriting
Natural Handwriting

- good line quality
- good speed and rhythm
- pen pressure fluctuation
- continuous movement
- tapered beginning and ending strokes
- no subtle retouching or addition
Unnatural Handwriting

- poor line quality
- poor speed and rhythm
- lacks pressure fluctuation
- disconnections
- blunt line endings
- retouching (usually subtle)
- presence of guidelines
Fraudulent Writings - Types

Simulation
An attempt by one writer to copy the writing habits of another writer

Tracing
An attempt by one writer to copy the writing habits of another writer by various tracing and projection techniques

Disguise
An attempt by one writer to change his own writing habits
Specimen Handwriting

Standards of Comparison

Two types of Specimen Handwriting

• **Request** – writing executed at the request of the investigator

• **Collected** – writing executed in the ordinary course of social or business activities

~ Complement one another ~
Specimen Handwriting
- Request Specimens

**PROS**
- Control of content
  - Text duplication
  - Style of writing
  - Writing instrument
  - Type of document
  - Quantity
- Authorship is ‘proven’

**CONS**
- Possibility of disguise
- Reduced variation
- All specimens produced at the same time
- Usually only one chance
- May not get any specimen
- The subject may refuse to produce specimen
Examples

Request Specimens

Questioned Cheque

Request Specimens
Specimen Handwriting
- Collected Specimens

**PROS**
- Natural handwriting
- Not disguised
- Contemporary
- Wider range of variation
- May be the only specimens available
- Almost everyone writes

**CONS**
- Not comparable
- Different text
- Different style of writing
- Different type of document
- Different writing instrument
  - Difficulty proving Authorship
- No admission
- No witness

Royal Canadian Mounted Police
Gendarmerie royale du Canada

Canada
Collected Specimens

- Sources

- Cancelled cheques
- Personal notes or letters
- Business correspondence
- Bank documentation
- Job applications
- School notes
- School assignments
- Personal diaries
- Personnel files
- Time cards
- Miscellaneous forms
Specimen Handwriting - Quantity

**Signature Only**

**Request:**
- 10 - 15 samples

**Collected:**
- 10 - 15 samples

**Extended Handwriting**

**Request:**
- 3 - 5 repetitions of the exact questioned text

**Collected:**
- 3 - 5 documents with the same handwriting style
Signature Comparison

Questioned

Specimens

a J. Hooker

a J. Hooker

a J. Hooker
Handprinting Comparison

Questioned

Specimens

SHOOT SHOT-GUNS
OTHER SSHH
ANGEFSGH
YOURMUL
FNOUCHEE
BANK
HAOUUPWO

FLASH HICHT
H.HS SHOTGUN
HGB AGS BONHS
TNILHONYU
F.F.E COMPLETE BZ
HH TACKHE
OWBONS
Case Example - Handprinting

• An armed robbery of a jewelry store netted $150,000.00 in jewelry and $3,000.00 cash.

• During the arrest of the accused four pages of robbery plans, escape plans and a floor plan were seized.

• The various plans and notes were compared to specimen hand printing from the suspect.
The writer of the comparison specimens **wrote** the questioned hand printing.

Note the individuality in letter designs of the lower case “b”, “d”, “f”, “k” and the upper case “I” and “H”.

<table>
<thead>
<tr>
<th>Q</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>Screen</td>
</tr>
<tr>
<td>half of</td>
<td>from feeling</td>
</tr>
<tr>
<td>wiring T.</td>
<td>with sleeping</td>
</tr>
<tr>
<td>be best</td>
<td>be becoming</td>
</tr>
<tr>
<td>Hockey</td>
<td>how my my</td>
</tr>
<tr>
<td>key lock</td>
<td>ok the hours</td>
</tr>
<tr>
<td>retraced</td>
<td>dedication to</td>
</tr>
<tr>
<td>and</td>
<td>and arms in</td>
</tr>
<tr>
<td>claim</td>
<td>begin</td>
</tr>
<tr>
<td>Z'm Z I heart</td>
<td></td>
</tr>
<tr>
<td>Z I sweet</td>
<td>6:30</td>
</tr>
<tr>
<td>6:30</td>
<td></td>
</tr>
</tbody>
</table>
Handwriting or handprinting on walls or other surfaces can be examined.

If possible, submit the item on which the notation is written, i.e. mirror, door, etc.

If not possible, good quality digital photographs should be submitted.
Case Example - Simulation

• A forgery investigation arose from a civil litigation involving an estate settlement with two Wills. There were signatures on an earlier Will and a more recently dated Will.

• The more recent Will significantly altered the beneficiaries.

• The analysis mandate was to determine which Will signature, if either, was legitimate?
The writer of the specimen signatures wrote the questioned signature on Q1.
William Magutinec
Case Example - Tracing

• A bank teller was charged with theft after funds were found missing from at least four senior citizens’ accounts.

• Several withdrawal forms were seized for comparison to the suspect’s handwriting.
treasury Branches

$ 950- 100

indied and fifty

Blanche Drader
Tracing

- classic tracing “guidelines” in carbon
- poor line quality in the inked overwriting
- face details on the questioned withdrawal forms written by the accused
Conclusions

.identification

.probability of identification

.no conclusion

.probability of elimination

.elimination
Document Examination

- Office Equipment
- Alterations Detection & Decipherment
- Indentations Detection & Decipherment
- Physical Match
Case Example – Printing Process

- Accountant accused of misappropriation of funds ($67,000 worth) via transfer letters on company letterhead.

- The analysis was to determine how the documents were produced.
• Legitimate letterhead printed with offset printing.

• Letters show smooth, even edges with a solid ink deposition.

• Questioned document produced using a cut-and-paste method and a colour copier.

• The copier uses a printing process (mix of 3 colour toners CMY) different from the offset printing (one colour ink).
Case Example - Photocopier

- Anonymous letters were mailed to the media claiming serious wrongdoing in a local Revenue Canada office.

- Exhibits submitted included photocopies from a suspect photocopier seized at the suspect’s residence.
Photocopier

• The Revenue Canada office photocopier had a scratch in the glass platen as well as other “trash” marks.

• These characteristics were consistent with those found on the questioned photocopies.

• The photocopier was identified as the source of the questioned documents.
Location: Revenue Canada offices in Saskatoon

Main Actors: ES and GT

Minor Actors: BD, LM, DN

Act No 1: ES and GT accepted $5000 from each of PD, LM, DN to give them jobs in Federal Govt. I can prove from which Bank money was borrowed to this and tape recorded voice of minor players.

Act no 2: BD and LM were promoted recently by ES and GT. Consideration calls for $500 dollars every month for 12 months otherwise they will fail probation period.

If ES and GT are suspended and an independent enquiry held proof beyond doubt will be produced with tape recorded voice of minor players.
The arrow points to a set of three small ‘trash marks’ linked to damage on the photocopier glass platen.
Types of Alteration:

- Erasure
- Addition
- Obliteration
Detection and Decipherment Techniques:

- Microscopic Examination
- Infra Red Reflectance
- Infra Red Luminescence
Alteration/Erasure

Microscopic examination reveals evidence of erasure:

- paper fibre disturbance
- extraneous ink
- disturbance in background pattern
Alteration/Addition

- Infra-Red Reflectance and Infra-Red Luminescence can be used to detect additions made to documents.

- Amount on an invoice as seen under normal illumination
Alteration/Addition

Infra-Red Reflectance

Infra-Red Luminescence

Difference in ink shows the added information
Alteration/Addition
Alteration/Addition

PAY TO THE ORDER OF Jason Carpenter $700 1/100

Seventeen hundred

DATE 2009 02 09

THE BANK OF NOVA SCOTIA

www.scotiabank.com 1-800-4-SCOTIA

GLoucester Centre
2400 City Park Drive
Gloucester, Ontario K1J 1H6

Katie Miller

Royal Canadian Mounted Police
Gendarmerie royale du Canada
Alteration/Obliteration

Obliterated text as seen under normal illumination.

Text is deciphered using Infra-red reflectance.
Case Example
Alteration/Obliteration

• A small-town church registry was signed by a guest who didn’t use his own name.

• The undesirable entry was obliterated by the minister. This obliteration then had to be deciphered to try and find a suspect.

• Unfortunately, writing on the reverse side made the usual decipherment method ineffective.
Case Example - Alteration/Obliteration

Questioned entry with visible light

Transmitted light

Same image digitally enhanced
Case Example – Faded Ink

• ‘Faded’ information on an inhaler may help identify a ‘found body’.

• Some information was visible but not enough to identify the body.

• The analysis results provided sufficient information to allow for a probable identification of the body.
Middle of the inhaler
Right side of the inhaler

Normal ‘room’ lighting
Middle of the inhaler

Right side of the inhaler

Infrared luminescence lighting
Detection and Decipherment Techniques:

- Oblique lighting
- Electrostatic techniques
Case Example – Indentations

- A note used during a Bank hold up was left at the scene.
- Investigators, after searching the residence of a suspect, seized a pad of paper.
- The pad and hold-up note were submitted to the laboratory for analysis.
Hold-up note left at the scene

Sheet of paper from the pad found at the suspect’s residence
Hold-up note

Indentations deciphered on the sheet of paper from the pad

(This image shows only the upper portion of the pad)
Physical Match

Document Reconstruction:

• Manual Process

• Laborious and time consuming when there is a large amount of shredded documents
Case Example – Physical Match

- Two pieces of masking tape were found on separate drug seizures.

- To establish a link between the two seizures the tape pieces were examined to see if they could be physically matched together.
• The tear pattern along the common edge of the two pieces shows that they were, at one time, joined together
This investigation involved the abduction and murder of a female child.

When her body was found, a search disclosed several paper Christmas decorations in her jacket pockets from a restaurant promotion.

Pieces of similar paper were found on the floor of a vehicle driven by the suspect.
This is the bottom of the ‘J’ shaped hook. Note the torn area on the right side.

This is the empty area on the original package showing the small piece of paper left behind.

Physical Match
Counterfeit Examination

Provide a forensic analysis service in counterfeit documents to all law enforcement agencies in Canada:

- Recognized expertise in Currency, Travel Documents, Payment Cards & Negotiable Instruments
- For criminal court & hearings (i.e. Immigration, IR Board)
- Crime scene attendance with technical assistance provided on demand
Counterfeit Examination
Currency Examinations

- Currency examinations represent the majority of the casework in the Counterfeits discipline at NACB
NACB Classification System

Technical Bulletins:

• Show specific defects
• Certain features of a counterfeit BN are similar

Examples:

• Fibres always in same spot
• Minor imperfections in the image…
General Guidelines

• A counterfeit bank note is always of a lesser quality than the genuine

• To the trained eye, the counterfeit can generally be detected at a glance

• Always compare with a genuine BN when possible…
Counterfeit Detection

Counterfeiting Methods:

• Inkjet (Color Printer) 95%

• Toner 4 %
  (Color Photocopier / Laser Printer)

• Finishing operations
Inkjet - Portrait

- Genuine
- (fine-line patterns)

- Inkjet Counterfeit
- (CMYK dots)
Inkjet is not water-proof
Toner - Portrait

- Genuine (fine-line patterns)
- Toner Counterfeit
- (CMYK scan lines)
Toner – Another Test

- Folds in the paper will cause toner to crack
Watermark Simulation (Inkjet-HS012) – White Toner
Computer generated notes account for nearly all counterfeits.
Exception – Finishing operations

- Traditional / Commercial printing methods utilized in additional applications
- Hot foil stamping of optically variable devices
Finishing operations

- Hot foil stamping

- Holographic Stripe
- & Security Thread
Polymer Banknotes
Security Features at a Glance

- Metallic portrait
- Large window
- Transparent text
- Small numbers
- Maple leaf border
- Metallic building

Frosted maple leaf window
Hidden numbers
Raised ink

Metallic portrait
Small numbers
Metallic building
Maple leaf border
How to Check Your Notes

Feel. Look. Flip.
Feel

Polymer

Raised ink
Look

Large window
Look

Metallic portrait

Matching portraits
Look

Metallic building

Sharp colour changes appear when you tilt the note.
Transparent text

Small numbers
Maple leaf border
Metallische Bilder und kleine Zahlen auf der Vorderseite der Note werden in der gleichen Farbe und Detail auf der Rückseite wiederholt.

Inhalt des großen Fensters
Look

Frosted maple leaf window
Look

Hidden numbers
Feel, Look and Flip

Feel
• The smooth texture of the note printed on a single piece of polymer
• The raised ink

Look
• Through the large window and the outline of the frosted maple leaf window
• At the metallic images

Flip
• The metallic images are visible on the back
Other types of examinations

-Payment Cards

- Examination, reporting and classification is conducted at NACB
- Information of first appearances is communicated via Alert Bulletins
- NACB was one of first to partner & develop int’l classification system aimed at promoting the exchange of information
- Analysis conducted at NACB is shared with Interpol’s Universal Classification System for Counterfeit Payment Cards
Payment Cards

(Printing equipment commonly used by counterfeiters)

- 4-color ribbons
- Dye Diffusion
- Thermal Transfer Printing
Other types of examinations
– Payment Cards and other ID
Other types of examinations

- Travel Documents

• Travel documents include:
  - Passports
  - Identity cards
  - Driver’s licences
  - Birth certificates

• All exhibits submitted to NACB are examined for authenticity and/or alteration
Altered Ontario Driver’s Licence

Thick laminate glued on top of genuine licence
Altered Ontario Driver’s Licence

Genuine

Altered

Inkjet printed photograph on the underside of laminate.
• For more information on Currency Education visit the Bank of Canada’s WebSite

http://www.bankofcanada.ca/en/banknotes
Questions?